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FOREWORD

The frontispiece of this issue is a photograph of P. G. Law, who is Director of the Antarctic Division of the Australian Department of External Affairs. In 1947, when a lecturer in physics at Melbourne University, he was appointed Senior Scientific Officer of the Australian National Antarctic Research Expedition (A.N.A.R.E.) to draw up and organize its scientific programme. In 1949 he became Leader, and, in the same year, was appointed to his present post. He has made ten voyages to sub-Antarctic and Antarctic regions, including one as Australian Observer with the Norwegian-British-Swedish Antarctic Expedition in 1950. In A.N.A.R.E. he has built up a solid and valuable scientific organization, and has been responsible, more than anyone except Sir Douglas Mawson, for awakening and sustaining the Australian Government's interest in its Antarctic possessions.

In January 1956 J. M. Wordie resigned from his position as Chairman of the Committee of Management of the Scott Polar Research Institute. He had been Chairman for nineteen years, and was one of the original members of the Committee when it was set up in 1926. The Institute is very conscious of the debt of gratitude it owes to him for his advice and interest. He is, however, to remain a member of the Committee. He is succeeded by J. A. Steers, Professor of Geography at Cambridge University.

The series of reconnaissance flights carried out by the U.S. "Operation Deep-freeze 1" during the 1955-56 season are pointers to a new era in Antarctica. From New Zealand to Antarctica, and then from an airstrip on the sea ice in McMurdo Sound, four-engined Skymasters have made non-stop flights towards each quarter of the coast of the continent and back; these included flights to points on the Weddell Sea, the Knox Coast and Dronning Maud Land, in addition to an elaborate programme of cross-flights. They are not the longest polar flights on record, though they are considerably longer than any previous Antarctic ones; their importance lies not so much in their achievement, which was considerable, as in what it represents. They mark the end of the isolation of Antarctica and emphasize the political necessity for agreed solutions of the difficult questions of sovereignty there. Recent technical advances in aviation and icebreaker construction, coupled with willingness in several countries to expend very large sums of money on Antarctic investigations, has suddenly accelerated the work of exploration. The era of competing territorial claims, official indifference and amateur exploration is giving way to a concentrated effort by governments to strengthen claims and to assess potential resources.

Intensification of Soviet activity in the Antarctic is naturally causing many to wonder about motives and intentions. Apart from Bellingshausen's great voyage of 1819-21, Russia remained aloof from Antarctic affairs until 1939. In that year the Soviet Government sent a Note to the Norwegian Government in which the Norwegian claim to Peter I Øy was disputed, and the

U.S.S.R. "reserved its opinion as to the national status of territories discovered by Russians". Soviet moves since the war have taken three main forms: first, whaling in the Southern Ocean, started in 1946; second, propaganda and diplomatic activity to establish a basis for participation in any political settlement; and third, participation in the International Geophysical Year, with land stations on the Antarctic continent. The second development started in 1946 with attempts to discredit the work of other nations and to represent Antarctica as another cause of imperialist competition. By 1948 the emphasis had changed towards a concentrated effort to provide a legal basis for Soviet rights based on priority of discovery. In June 1950 the Soviet Government sent identical Notes to all the nations with Antarctic claims indicating that they could not agree that the future regime of the Antarctic should be decided without Soviet participation; nor could they recognize any solution reached in their absence. Polemics against Western activities were muted from 1953 onwards. Once more the emphasis changed, the press began to advocate international scientific co-operation in the Antarctic. By 1955 the political and legal arguments had almost disappeared and were replaced by reports of Soviet plans and preparations for the International Geophysical Year. The most spectacular part of the Soviet programme is the plan to establish two 9000-nautical-mile air routes from Moscow to the Antarctic—one via Africa and the other via Singapore and Australia. The plan is for this service to provide the chief support for their three stations in the Antarctic.

These are major events for Antarctica, and their significance is, of course much wider. It remains to be seen whether all these activities can contribute to a solution of the political future of the continent, or whether they will make international agreement still more difficult.

Recent Antarctic activity has underlined once again the lack of British ships suitable for polar work. Of the countries taking part in the Antarctic phase of the International Geophysical Year, by far the best equipped are the United States, with eight fine icebreakers built since 1943, and the Soviet Union, with two new icebreakers and two building, to say nothing of fifteen or more of pre-war design. Yet of the seven countries with territorial claims only Argentina possesses an icebreaker. Surely, if this country is to continue to play a leading part in Antarctic affairs, she must not continue to spurn the freedom of action that only an icebreaker can provide.

April 1956

FROZEN WORDS

BY EDWARD M. WILSON AND P. RICKARD

[MS. received 16 January 1956.]

Can words freeze as soon as uttered, and thus become inaudible? Polar research does not confirm it, and even the layman may well suspect that there are serious scientific objections to such a notion, and to its corollary, which is that congealed words should become audible on thawing. Yet this idea, through the ages, has given rise to a series of literary anecdotes and allusions, all of them humorous or satirical in intention.¹ It is interesting to speculate how the idea arose in the first place. Hyperbole, including deliberately facetious hyperbole, is always present in the popular imagination, which tends to seek vivid, graphic, and sometimes wildly improbable comparisons in order to make its point. The heat of hell, and the coldness of charity, are equally undemonstrable from the strictly scientific point of view, while the goodness of gold must be regarded as ethically unverifiable, however effective as alliteration. We must imagine that some early wit once said: "It's so cold in X that when you try to say something, your words freeze and fall to the ground." As a matter of fact, something very similar was attributed by Plutarch to one Antiphanes. In a chapter of the *Moralia* entitled "How a man may become aware of his progress in virtue"² we find this anecdote:

Antiphanes said humorously that in a certain city words congealed with the cold the moment they were spoken, and later, as they thawed out, people heard in the summer what they had said to one another in the winter; it was the same way, he asserted, with what was said by Plato to men still in their youth; not until long afterwards, if ever, did most of them come to perceive the meaning, when they had become old men.

Here the point is the delayed comprehension implicit in both halves of the comparison.

After this, frozen words as a literary theme appear to have remained 'congealed' until the great thaw of the Renaissance, for we do not hear of them again until the early sixteenth century, when Baldassare Castiglione (1478-1529) introduced them into modern vernacular literature. His most famous work is his treatise in dialogue called *Il Cortegiano*, in which he makes his friends discuss all the virtues and accomplishments which the ideal courtier should possess. This masterpiece was first drafted in 1508 and was probably completed by 1516; it was printed in 1528 and became extremely popular, being translated into French (1538), Spanish (1540), and English (1561). Sir Thomas Hoby's English version was reprinted in 1577, 1587 and 1603, and a Latin translation by B. Clerke went through six editions between 1571 and 1611. There is no need here to discuss the varied contents of this magnificent dialogue. Our concern is with one paragraph (No. 55) of the second book.

It occurs in a discussion of the kinds of funny stories which a courtier can tell, for "whatsoever . . . causeth laughter, the same maketh the minde jocunde and geveith pleasure, nor suffreth a man in that instant to minde the troublesome greeffs that oure life is full of"; yet it is also necessary to decide which "jestes and meery conceites that move laughter . . . are meete for the Courtier and whyche are not, and in what time and maner they ought to be used".³ The question is discussed at length, and a number of humorous anecdotes are recounted. Among them is the following, told by Giuliano dei Medici:

The L. JULIAN said smilinge: This merchaunt man (as he saith) beeing upon a time in Polonia, determined to buie a quantitie of Sables, mindinge to bringe them into Italy and to gaigne greatly by them. And after much practisinge in the matter, where he coulde not himselfe go into Moscovia bicause of the warre beetweene the kynge of Polonia and the Duke of Muscovia, he tooke order by the meane of some of the Countrey that upon a day apointed certein merchaunt men of Moscovia shoulde come with their Sables into the borders of Polonia, and he promysed also to be there himselfe to bargain with them. This merchaunt man of Luca travailing then with his companie toward Moscovia, arrived at the river of Boristhenes, which he found hard frozen like a marble stone, and saw the Moscovites, which for suspicion of warr were in doubt of the Polakes, were on the other side, and neerer cam not than the breadth of the river. So after they knewe the one the other, makinge certein signes, the Moscovites beegan to speake aloud and toulde the price how they would sell their Sables, but the colde was so extreme, that they were not understood, bicause the woordes beefore they came on the other syde where thys merchaunt of Luca was and his interpreters, were congeled in the aere and there remayned frosen and stopped. So that the Polakes that knew the maner, made no more adoe but kindled a great fire in the midst of the river (for to their seeminge that was the point whereto the voice came hott beefore the frost tooke it) and the river was so thicke frosen that it did well beare the fire. When they had thus done the wordes that for space of an houre had bine frosen beegan to thawe and cam doune, making a noyse as doeth the snow from the mountaignes in Maye, and so immediatlye they were well understood, but the men on the other side were first departed, and bicause he thought that those woordes asked to great a price for the Sables, he would not bargain, and so cam away without.

Then they laughed all.⁴

The humour lies simply in the congruity of ordinary human behaviour with an absurd impossibility. Castiglione tells the story for its own sake; he does not use it to satirize any group or individual, any human foible or philosophical theory. It is simply a well-told funny story.

A few years later, an Italian named Celio Calcagnini, who died in 1541, published a collection of apologues or moral fables, of which two are concerned with "frozen words". The first is entitled *Voces frigoris vi congelatae*.⁵

A certain father heard by chance that there were two very famous schools in the world, at which young men were educated. One of them was situated in India, and there, however much one strained one's ears, words melted on account of the intense heat and, either immediately or very soon, turned to liquid. The other one lay in the far north, and there, on account of the extreme cold, words froze and congealed so completely, that only when summer eventually came did they reach the ears of the listener. The father asked Solon: "To which one should I send my son to study?" Solon replied: "It is for you to choose, but I should prefer the northern one."

The reason for this preference is not given, but we may guess that Solon saw the advantage of a school where words *eventually* became audible over one where they apparently were *never* heard. At all events, Calcagnini deserves credit for his novel treatment of the theme, particularly for the idea that words may be adversely affected by intense heat as well as by intense cold. His second fable does not claim to be original: it is simply Plutarch's story about Antiphanes in a slightly different form, and entitled *Voces frigore concretæ*:⁶

Antiphon (*sic*) made up a nice moral fable for us, saying that there was at the North Pole a city where words uttered in the winter straightway turned to ice on account of the intense cold, and were not heard until with the advent of summer they melted and so reached the ear. He said it was much the same with young men, for they, with the sloth and heedlessness characteristic of their age, do not hear the words of those who give them sound advice, until later in life they become more serious and mature.

It is to be noted that there is no reference here to Plato, that Antiphanes has become corrupted to Antiphon, and that the "certain city" in Plutarch has been located at the North Pole (*sub ipso mundi cardine*). But these differences are slight, and in this second fable we may see the source for the first, in which, starting with the basic idea of frozen words, Calcagnini has created a different story of his own devising.

For the most elaborate and also the best-known literary manifestation of the theme of frozen words we have to thank the inventive genius of François Rabelais, doctor, scholar and wit, and author of what is one of the greatest literary creations of all time, *The History of Gargantua and Pantagruel*, the sum of the knowledge and experience of a whole age. After many adventures, Pantagruel, son of Gargantua, and his scoundrelly companion Panurge set out together in quest of the "Oracle of the Holy Bottle", which is to decide whether Panurge should marry or not. The "frozen words" episode occurs in the fifty-fifth and fifty-sixth chapters of the Fourth Book (published in 1552): the ships bearing our two adventurers and their followers have just left the land of Papimanie and are near the Pole, on the confines of the sea of ice, which they do not, however, penetrate. The time is the end of June, and the polar ice is melting. Now let us allow Rabelais to tell the tale himself, through the English rendering of Le Motteux, first published in 1694.

How Pantagruel, being at sea, heard various unfrozen words

When we were at sea, junketing, tipling, discoursing, and telling stories, Pantagruel rose and stood up to look out; then ask'd us, Do you hear nothing, Gentlemen? Methinks I hear some people talking in the air; yet I can see nobody; Hark! According to his command we listen'd, and with full ears sucked in the air, as some of you suck oysters, to find if we could hear some sound scatter'd through the sky; and to lose none of it, like the Emperor Antoninus, some of us laid their hands hollow next to their ears: But all this wou'd not do, nor cou'd we hear any voice. Yet Pantagruel continu'd to assure us he heard various voices in the air, some of men, and some of women.

At last we began to fancy that we also heard something, or at least, that our ears tingled; and the more we listen'd, the plainer we discern'd the voices, so as to

distinguish articulate sounds. This mightily frightened us, and not without cause, since we could see nothing, yet heard such various sounds and voices of men, women, children, horses, etc. insomuch that Panurge cried out. . . . Pantagruel, hearing the sad outcry, which Panurge made, said, Who talks of flying? Let's first see who they are; perhaps they may be friends: I can discover no body yet, tho' I can see a hundred miles round me: But let's consider a little; I have read, that a philosopher, named Perron (*sic*), was of opinion, that there were several worlds that touch'd each other in an equilateral triangle; in whose centre, he said, was the dwelling of truth; and that the words, ideas, copies and images of all things past and to come, resided there: round which was the age; and that with success of time part of them us'd to fall on mankind like rheums and mildews, just as the dew fell on Gideon's fleece, till the age was fulfilled. I also remember, continu'd he, that Aristotle affirms Homer's words to be flying, moving, and consequently animated. Besides, Antiphanes said, that Plato's philosophy was like words which being spoken in some country during a hard winter, are immediately congeal'd, frozen up, and not heard; for what Plato taught young lads, could hardly be understood by them when they were grown old: Now, continu'd he, we should philosophise and search whether this be not the place where those words are thaw'd. . . .

Pantagruel's bold conjectures do not end with the anecdote from Plutarch, but this is a suitable point at which to cut them short, for he has come very close to the correct explanation, as we shall see in the next chapter, which is entitled:

How among the frozen words, Pantagruel found some odd ones

The skipper made answer; Be not afraid, my Lord, we are on the confines of the frozen sea, on which, about the beginning of last winter, happen'd a great and bloody fight between the Arimaspians and the Nephelibates. Then the words and cries of men and women, the hacking, slashing and hewing of battle-axes, the shocking, knocking and joulting of armours and harnesses, the neighing of horses, and all other martial din and noise, froze in the air: and now the rigour of the winter being over, by the succeeding serenity and warmth of the weather, they melt, and are heard.

By jingo, quoth Panurge, the man talks somewhat like: I believe him; but cou'dn't we see some of 'em? Methinks I have read, that on the edge of the mountain on which Moses receiv'd the Judaic law, the people saw the voices sensibly. Here, here, said Pantagruel, here are some that are not yet thaw'd. He then throw'd us on the deck whole handfulls of frozen words, which seem'd to us like your rough sugar-plumbs, of many colours, like those us'd in heraldry, some words *gules* (This means also jests and merry sayings) some *vert*, some *azure*, some *black*, some *or* (This means also fair words;) and when we had somewhat warm'd them between our hands, they melted like snow, and we really heard them, but cou'd not understand them, for it was a barbarous gibberish; one of them only that was pretty big, having been warm'd between Fryar Jhon's hands, gave a sound much like that of chesnuts when they are thrown into the fire without being first cut, which made us all start. This was the report of a field-piece in its time, cry'd Fryar Jhon. Panurge pray'd Pantagruel to give him some more; but Pantagruel told him, that to give words, was the part of a lover. Sell me some then, I pray you, cry'd Panurge. That's the part of a lawyer, returned Pantagruel; I wou'd sooner sell you silence, tho' at a dearer rate, as Demosthenes formerly sold it, by the means of his argentangina or silver squinsey. However, he threw three or four handfulls of them on the deck, among which I perceiv'd some very sharp words, and some bloody words, which, the pilot said, us'd sometimes to go back and recoil to the place whence they came, but 'twas

with a slit wesand; we also saw some terrible words, and some others not very pleasant to the eye.

When they had been all melted together, we heard a strange noice, hin hin, hin hin, his, tick, tock, taack, brededin, brededack, frr, frr, frr, bou, bou, bou, bou, bou, bou, track, track, trr, trr, trr, trrr, trrrrr, on, on, on, on, on, on, ououououon, gog, magog, and I do not know what other barbarous words, which, the pilot said, were the noise made by the charging squadrons, the shock and neighing of horses. Then we heard some large ones go off like drums and fifes, and others like clarions and trumpets. Believe me, we had very good sport with them. I wou'd fain have sav'd some merry odd words, and have preserv'd them in oil, as ice and snow are kept, and between clean straw: But Pantagruel would not let me, saying, that 'tis a folly to hoard up what we are never like to want, or have always at hand, odd, quaint, merry and fat words of *gules* never being scarce among all good and jovial Pantagruelists.

Here the episode of the frozen words comes to an end, and the reader is led on to further merry conceits. That Pantagruel, faced with this phenomenon, should seek a rational explanation, while the unworthy Panurge gives way to panic fear, is typical both of Rabelais's characterization of this pair, and of his optimistic faith in science. The starting-point for all this is again Plutarch's anecdote, actually quoted (without acknowledgement) by Pantagruel, but Rabelais has filled it out with a wealth of imaginative detail, thus giving the incident a kind of spurious plausibility. While others had contented themselves with a rather vague statement about freezing and subsequent thaw, Rabelais went so far as to describe the physical characteristics of frozen words, for the earthy Panurge was not content to consider them in the abstract. So we are given an opportunity of handling these curious little coloured objects, of holding them up to the light and inspecting them, and, by warming them in our hands, of transmuting them once more into their appropriate sounds. The discussion is never allowed to become too serious: in any Pantagruelian dialogue, pun and smart retort are never absent for long. Certainly there are some "loose ends" in the episode: for one thing the frozen words themselves, solid and ponderable enough, seem to have remained improbably suspended in the air for several months. But any solemn or pedantic attempt to point out improbabilities in this episode would only provoke the mirth of "all good and jovial Pantagruelists".

It is highly probable, moreover, that behind the episode of the frozen words lurks much that was topical when Rabelais wrote. V. L. Saulnier has suggested⁷ that the battle between the Arimaspians and the Nephelibates symbolizes the war between the Protestant princes of Germany and the Emperor Charles V. This war had ended in 1547, but, when Rabelais was writing his Fourth Book, everyone expected that it would soon be resumed, that war-cries, like the frozen cries of the Arimaspians and Nephelibates, would soon be heard again. The symbolism may go even deeper: Rabelais was no Calvinist, but he was certainly on the side of those who favoured some of the new ideas of the Reform, as against the traditionalists. Around the middle of the sixteenth century, the Reformers, where detected, were being actively persecuted,

and neither they nor their secret sympathizers could safely speak their minds. Rabelais may have tried to suggest, through the myth of the frozen words, that the truth, though at present stifled and rendered inaudible by a hostile "climate", would one day be heard. On the other hand, it will be noted that the words of the Arimaspians and Nephelibates are completely unintelligible, at least to Pantagruel and his companions.

The humorous fancies of Castiglione and Rabelais were well known in seventeenth-century England. The former influenced an account of life in Northern Russia which appeared in a geographical treatise that was first printed at Oxford in 1621 and was frequently reprinted later. Its author, Peter Heylyn, tells us how in Russia water thrown into the air "will turn to yce before it fall to the ground"; and how "the better to resist the extremity of this cold, not only the cloathes of this people, but their very houses are lined with thick Furies". He goes on:

This excess of cold in the ayre, gaue occasion to *Castilian* [i.e. Castiglione] in his *Aulicus* [i.e. *Il Cortegiano*], wittily and not incongruously to faine; that if two men being somewhat distant, talke together in the winter, their words will be so frozen, that they cannot bee heard: but if the parties in the spring returne to the same place, their words wil melt in the same order that they were frozen and spoken, & be plainly vnderstood.⁸

This is, of course, only very approximately what Castiglione had said, and we must suppose either that Heylyn remembered the anecdote badly and invented some details or, the more likely supposition, that he confused it or deliberately improved it with a little Rabelais or Plutarch.

The other English examples of jokes about frozen words seem all to derive from Rabelais. No one—so far as we know—thought that words really were frozen or took this hoary joke for scientific fact. The fiction that words or phrases could congeal into solid lumps which revealed their meanings only when thawed could be applied to writers or speakers whose style was pedantic, crabbed or clumsy, could, in fact, be a reflexion on the speaker and not only on the hearer—for we must remember that the story in Plutarch expressed a criticism of Plato's young disciples. Samuel Butler used it to ridicule the pedantries of nonconformist divines. The idea could also be used more naturally as a satire on travellers' tales; and so Thomas Coryat found himself mocked by one who may well have been one of England's great poets.

Thomas Coryat (?1577–1617) spent five months in travelling through France, Italy, Switzerland, Germany and Holland in 1608. He was a native of Odcomb in Somerset and had attracted the attention of Henry, son of James I, at the Court. The wits of the day regarded him as a butt, and he seems to have willingly accepted the notoriety which that situation brought him. He published his travels in 1611; they bore the title: *Crudities*.⁹ The book is entertaining in places, and we find ourselves laughing with him as well as at him as we read it. The first 108 pages of the quarto edition are taken up with poems by his contemporaries about him and his travels. The poems all make fun of him to a greater or less degree, and many of them are pretty

insulting. Two tributes purport to come from John Donne. The first is certainly authentic: the second, which is headed "Incipit Joannes Dones" does not appear among the authentic poems in the Grierson edition of Donne's poems. The editor says: "It may be by Donne, but was not printed in any edition of his poems." He therefore prints it in the Commentary to the authentic poems, not among them. This poem begins by suggesting that Coryat's book contains a word for every step taken; what would it have been like if he had accompanied Drake or Magellan? The poem continues:

It's not that *French* which made his *Gyant* see
Those uncouth Ilands where wordes frozen bee,
Till by their thaw next yeare they'r voic't againe;
Whose *Papagauts*, *Andoüilets*, and that traine
Should be such matter for a Pope to curse
As he would make; make! makes ten times worse,
And yet so pleasing as shall laughter moue;
And be his vaine, his gaine, his praise, his loue.¹⁰

The passage is obscure. Perhaps the meaning is: Rabelais's account of the northern isles, the Papagauts and so on, was unorthodox and so was cursed by the Pope. Coryat, if he had visited these regions, would have been even more heretical, but he would also have made his readers laugh at his ignorance, which would have fed his vanity and made money for him. The compliment is oblique, and so is the final paragraph of this poem, which begins:

Sit not still then, keeping fames trump vnblowne:
But get thee *Coryate* to some land vnknowne....

Donne, or his impersonator, took Rabelais's fun and hinted that Coryat's truth was even more nonsensical.

Samuel Butler (1612-80) wrote a satire on the Puritans which is nowadays seldom read. Few people care to take the trouble to thread this ingenious labyrinth of paradox to arrive at what seems a negative goal: the exposure of sham religion induced by self-delusion and conscious hypocrisy. The first part of *Hudibras* was printed in 1663. It tells how a Presbyterian knight-errant rides out to reform England by suppressing the worldly amusements of the lower classes. This verse satire is modelled on *Don Quixote*, but the style is entirely burlesque; Hudibras has no nobility, and Ralpho his squire is merely an enthusiastic ignoramus. The most readable part of the poem is the early part in which Ralpho's and Hudibras's religion and intellectual faculties are described. Butler did this by means of mock panegyric: he expressed paradoxically and ingeniously an exaggeration of a puritan attitude of mind or habit and then destroyed it by a ridiculous or nonsensical comparison:

He could raise Scruples dark and nice,
And after solve 'em in a trice,
As if Divinity had catch'd
The Itch, of purpose to be scratch'd....

Frozen words thus become a means of exposing the crudity and absurdity of Hudibras's method of logic. Butler implies that his hero consistently made

simple things obscure, so that the particular became a mere generalized abstraction. He used algebra to read the time on a clock-face and trigonometry to resolve whether bread and butter wanted weight. So for *Hudibras* abstractions became particular and personifications became real. This state of affairs is a monstrous absurdity which runs counter to the common-sense of ordinary man; it is as ridiculous as Rabelais's fable, with which it is compared. In the first edition of *Hudibras* we find:

He'd tell where Entity and Quiddity,
The Ghosts of defunct Bodies, flie;
Where Truth in Prison does appear,
Like words congeal'd in Northern Air.¹¹

Later editions add another couplet and alter the metaphor:

He could reduce all things to Acts
And know their Natures by Abstracts,
Where Entity and Quiddity
The Ghosts of defunct Bodies flie;
Where Truth in Person does appear,
Like words congeal'd in Northern Air.

Butler has gone back through Rabelais to Plutarch and "Perron". And—as Pantagruel's frozen words came out helter-skelter—so *Hudibras*'s Truth bears no relation to fact or science.

The two later English examples are plainer to understand. Addison and Steele collaborated in a paper to the *Tatler* in 1710 which purported to be a modernized version of an unpublished manuscript by Sir John Mandeville. Sir John is the supposed author of a book of travels, first written in French in the fourteenth century. The name appears to be an assumed one, and the author has been tentatively identified with Jean de Bourgayne, a physician of Liège. The intention is purely humorous, although a few mild barbs are directed against the habits of sailors, Dutch boorishness and French frivolity. It is all very good-natured and refined, except for a reference to the cruel punishment of the strappado. Augustan elegance has replaced Rabelaisian vigour. There is no attempt to parody Mandeville's own manner or style. The article reads pleasantly enough, though it is much less amusing than Rabelais's two chapters. Here it is:

Splendide mendax—Hor.

From my own Apartment, Nov. 22 (1710)

There are no Books which I more delight in than in Travels, especially those that describe remote Countries, and give the Writer an Opportunity of showing his Parts without incurring any Danger of being examined or contradicted. Among all the Authors of this kind, our renowned Countryman Sir John Mandeville has distinguished himself, by the Copiousness of his Invention, and Greatness of his Genius. The Second to *Sir John* I take to have been Ferdinand Mendez Pinto,¹² a Person of infinite Adventure, and unbounded Imagination. One reads the Voyages of these Two great Wits with as much Astonishment as the Travels of *Ulysses* in *Homer*, or of the *Red-Cross Knight* in *Spencer*. All is Enchanted Ground and Fairy Land.

I have got into my Hands by great Chance several Manuscripts of these Two eminent Authors, which are filled with greater Wonders than any of those they have communicated to the Publick; and indeed, were they not so well attested, would appear altogether improbable. I am apt to think, the ingenious Authors did not publish them with the rest of their Works, lest they should pass for Fictions and Fables: A Caution not unnecessary, when the Reputation of their Veracity was not yet established in the World. But as this Reason has now no further Weight, I shall make the Publick a Present of these curious Pieces at such Times as I shall find my self unprovided with other Subjects.

The present Paper I intend to fill with an Extract of Sir *John's* Journal, in which that learned and worthy Knight gives an account of the Freezing and Thawing of several short Speeches which he made in the Territories of *Nova Zembla*. I need not inform my Reader, that the Author of *Hudibras* alludes to this strange Quality in that cold Climate, when, speaking of abstracted Notions cloathed in a visible Shape, he adds that apt Simile,

Like words congeal'd in Northern Air

Not to keep my Reader any longer in Suspence, the Relation put into modern Language is as follows:

We were separated by a Storm in the latitude of 73, insomuch that only the Ship which I was in, with a *Dutch* and a *French* vessel got safe into a Creek of *Nova Zembla*. We landed, in order to refit our Vessels, and store our selves with Provisions. The Crew of each Vessel made themselves a Cabbin of Turf and Wood, at some Distance from each other, to fence themselves against the Inclemencies of the Weather, which was severe beyond Imagination. We soon observed, that in talking to one another we lost several of our Words, and could not hear one another at above Two Yards Distance, and that too when we sate very near the Fire. After much Perplexity, I found that our Words froze in the Air before they could reach the ears of the Persons to whom they were spoken. I was soon confirmed in this Conjecture, when, upon the Increase of the Cold, the whole Company grew dumb, or rather deaf; for every Man was sensible, as we afterwards found, that he spoke as well as ever; but the Sounds no sooner took Air, than they were condensed and lost. It was now a miserable Spectacle to see us nodding and gaping at one another, every Man talking, and no Man heard. One might observe a Seaman, that could hail a Ship at a League Distance, beckoning with his Hands, straining his Lungs, and tearing his Throat, but all in vain.

-Nec Vox, nec Verba, sequuntur

We continued here Three Weeks in this dismal Plight. At length, upon a Turn of the Wind, the Air about us began to Thaw. Our Cabbin was immediately filled with a dry clattering Sound, which I afterwards found to be the Crackling of Consonants that broke over our Heads, and were often mix'd with a gentle Hissing, which I imputed to the letter *S*, that occurs so frequently in the *English* Tongue. I soon after felt a Breeze of Whispers rushing by my Ear; for those being of a soft and gentle Substance, immediately liquefied in the warm Wind that blew across our Cabbin. These were soon followed by Syllables and short Words, and at length by entire Sentences, that melted sooner or later, as they were more or less congealed; so that we now heard everything that had been *spoken* during the whole Three Weeks that we had been *silent*, if I may use that Expression. It was now very early in the Morning, and yet, to my Surprise, I heard some Body say, *Sir John, it is Midnight, and Time for the Ship's Crew to go to Bed*. This I knew to be the Pilot's voice, and upon recollecting my self, I concluded that he had spoken these Words to me some Days before, though I could not hear them before the present Thaw. My Reader

will easily imagine how the whole Crew was amazed, to hear every Man talking, and see no Man opening his Mouth. In the Midst of this great Surprise we were all in, we heard a Volley of Oaths and Curses, lasting for a long while, and uttered in a very hoarse Voice, which I knew belonged to the Boatswain, who was a very cholerick Fellow, and had taken his Opportunity of Cursing and Swearing at me when he thought I could not hear him; for I had several times given him the Strappado on that Account, as I did not fail to repeat it for these his pious Soliloquies when I got him on Ship-board.

I must not omit the Names of several Beauties in *Wapping*, which were heard every now and then, in the Midst of a long Sigh that accompanied them; as, Dear *Kate*! Pretty Mrs *Peggy*! When shall I see my *Sue* again? This betray'd several Amours which had been concealed till that Time, and furnished us with a great Deal of Mirth in our Return to *England*.

When this Confusion of Voices was pretty well over, though I was afraid to offer at Speaking, as fearing I should not be heard, I proposed a visit to the *Dutch* Cabbin, which lay about a Mile further up into the Country. My crew were extremely rejoiced to find they had again recovered their Hearing, though every Man uttered his Voice with the same Apprehensions that I had done:

-*Et timide Verba intermissa retentat.*

At about Half a Mile's Distance from our Cabbin, we heard the Groanings of a Bear, which at first startled us; but upon Enquiry we were informed by some of our Company, that he was dead, and now lay in Salt, having been killed upon that very Spot about a Fortnight before, in the Time of the Frost. Not far from the same Place we were likewise entertained with some posthumous Snarls and Barkings of a Fox.

We at length arrived at the little *Dutch* Settlement, and upon entering the Room, found it filled with Sighs that smelt of Brandy, and several other unsavoury Sounds that were altogether inarticulate. My Valet, who was an *Irishman*, fell into so great a Rage at what he heard, that he drew his Sword; but not knowing where to lay the Blame, he put it up again. We were stunned with these confused Noises, but did not hear a single Word till about Half an Hour after; which I ascribed to the harsh and obdurate Sounds of that Language, which wanted more Time than ours to melt and become audible.

After having here met with a very hearty Welcome, we went to the *French* Cabbin, who, to make Amends for their Weeks Silence, were Talking and Disputing with greater Rapidity and Confusion than ever I heard in an Assembly even of that Nation. Their language, as I found, upon the first Giving of the Weather, fell asunder and dissolved. I was here convinced of an Error into which I had before fallen; for I fancied that for the Freezing of the Sound, it was necessary for it to be wrapped up, and, as it were, preserved in Breath; but I found my Mistake, when I heard the Sound of a Kit playing a Minute [i.e. Minuet] over our Heads. I asked the Occasion of it, upon which one of the Company told me, that it would play there above a Week longer if the Thaw continued; for, says he, finding our selves bereft of Speech, we prevailed upon one of the Company, who had this Musical Instrument about him, to play to us from Morning to Night; all which Time we employed in Dancing, in order to dissipate our Chagrin, & *tuer le temps*.

Here Sir *John* gives very good Philosophical Reason why the Kit could be heard during the Frost; but as they are something Prolix, I pass them over in Silence, and shall only observe, that the honourable Author seems by his Quotations, to have been well versed in the ancient Poets, which perhaps raised his Fancy above the ordinary Pitch of Historians, and very much contributed to the Embellishment of his Writings.¹³

Our second English example comes from the *Travels* of "Baron Munchausen". This burlesque of travellers' tales was written in English by Rudolf Erich Raspe (1737-94), a Hanoverian German antiquary and geologist, who came to England under a cloud and who was both elected to, and expelled from, the Royal Society. The first edition of the *Travels* was published anonymously in 1785; most later editions have a revised and much inferior text, but fortunately that edited by Mr John Carswell and published by the Cresset Press in 1948 gives us Raspe's own words. The book is simple and diverting. The recipe for it consisted in adapting or imitating folk-tales of great liars and stringing them together. The learned idea of words or sounds frozen by Arctic cold could easily be assimilated to such material.

I travelled post day and night, and finding myself engaged in a narrow lane, I bid the postilion give a signal with his horn, that other travellers might not meet or stop us in the narrow passage. He blew with all his might, but all his endeavours were in vain. He could not make his horn speak, which, as he pretended to be a good performer, was as unaccountable to him, as to me, and rather unfortunately, for soon after we found ourselves in the presence of another coach coming the other way....

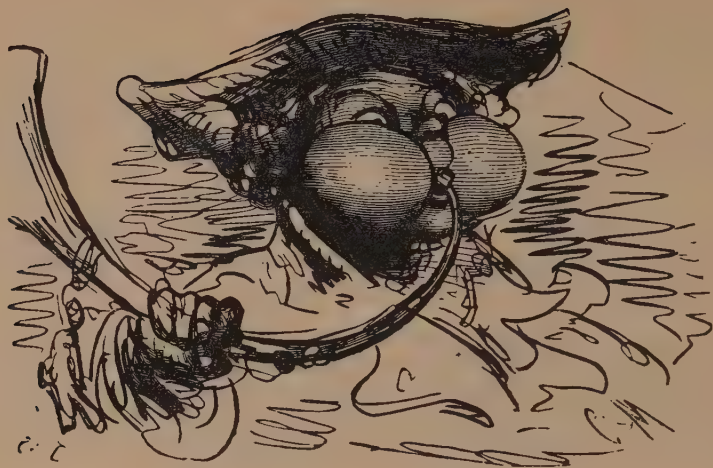
The travellers solved the difficulty by taking both coaches to pieces and reassembling them when their positions had been reversed. At the end of the day the Baron and his postilion rest at an inn.

The postilion hung his great coat and horn on a peg and sate down near the kitchen fire, to forget and drown his cares. I sat down on the other side, doing the same. Suddenly we heard a *Tereng! Tereng, teng, teng!* We looked round, and now found the reason, why the postilion had not been able to sound his horn. His tunes were frozen up in the horn, and came out now by thawing, plain enough and much to the credit of the driver, so that the honest fellow entertained us for some time with a variety of tunes, without putting his mouth to the horn—The King of Prussia's march,—Over the hill and over the dale—An evening hymn, and many other favourite tunes came out and the thawing entertainment concluded, as I shall this short account of my Russian travels with

God bless Great George our King.¹⁴

We may note that here it is sounds and not words which congeal, for we are not told that the travellers had any difficulty in speaking to each other. Yet for both Rabelais and "Sir John Mandeville" (as prompted by Steele and Addison) sounds and words were alike affected by the low temperature. But this apparent inconsistency on the part of Raspe is surely due to an oversight of the mendacious Baron, rather than to anything so subtle as exceptionally high frequency!

The final example is supplied by German literature, and occurs in a lengthy novel named *Hesperus*, which appeared in four volumes in 1795. The author was Johann Paul Friedrich Richter, usually known as "Jean Paul", and famous for the peculiar method by which he composed his novels: he used to accumulate scattered notes and jottings and then draw upon them at random, a method which helps to explain his disconnected and fantastic plots. This time there is properly speaking no anecdote, no incident concerning frozen



The frozen post-horn, from "Baron Munchausen's" *Travels*
(see p. 105).

words, but simply musings about them, suggested to a character in the novel by a reading of "Mandeville". Here then are Jean Paul's "polar paradoxes":¹⁵ Mandeville relates in his travels that in the six months of winter words freeze, but that in the six summer months they are heard. This piece of information exercised Victor's imagination as he made his way towards the island: let us apply our ears to his head and hearken to the buzzing of the thoughts within.

Mandeville and I are in no way obliged to explain *why* at the North Pole words turn to ice as soon as they come out, just like saliva, or as mercury behaves in those parts; but we are bound to draw inferences from the fact itself. When a smiling heir wishes his testator long life there, the dear man does not hear the good wishes until the following spring—which may already have killed him. The finest Christmas sermons fail to edify good souls until July. The Polar Court wishes His Highness a Happy New Year in vain: he hears nothing until it gets warm, and by that time the wish has lost half its validity. A stove ought to be installed in the antechamber, and its pipes used as a speaking-tube, so that the courtiers could be heard in conditions of warmth. At the Pole, a preacher would be ruined without a stove. A gambler may curse on St Thomas's Day (21st December), but his curses become audible only on Midsummer Day, by which time he may have won again. Winter concerts could be turned into summer concerts without any instruments: people would just take their places in the concert hall. What other reason is there for the fact that polar wars are frequently waged six months before they have been declared, if it be not that the declaration made in the winter is heard only in fine weather? In the same way, no news is heard of the winter campaigns of polar armies until the summer campaigns are in progress. I for my part would like to travel to the Pole just for the winter, so as to be able to insult people there, particularly the Prince's household, to their faces: when they finally heard the abuse, the offending party would be back in Germany again. Winter revels are in no way to blame if the northern government fails to expound and decide a large number of highly important matters: the voting becomes audible only during the midsummer recess, and only then can one hear the decrees of the Chamber in cases calling for indulgence or arbitration. But, oh saints above, what if at the Pole, with the sun in Capricorn and my heart in Cancer, I were to fall at the feet of the most beautiful woman and make the most ardent declarations of love to her all through the longest night, declarations which in a split second formed an icy precipitate and reached her ears in a frozen state, i.e. not at all? What would I do in the summer, by which time I would have already won her and cooled off; what would I do if at just the moment when I hoped to pick a quarrel with her, my Capricorn outpourings were to thaw and become articulate, right in the middle of my recriminations? I would phlegmatically adhere to this principle: be tender at the Pole, but only in Aries or Cancer. And finally, what if at the Pole a princess were being handed over in marriage—on the very spot where the earth does not move, a spot admirably suited for the twofold inactivity of princess and lady—what if the ceremony were to take place in a room in which everyone had slandered her during the long winter evenings? What if the very air in the room began to utter slanders?...

When Jean-Paul refers to Mandeville he means, of course, "Pseudo-Mandeville", i.e. Addison and Steele. The theme of the thawing sighs in the article in the *Tatler* probably suggested the polar declaration of love, just as the thawing insults in the same account have their echo in Jean Paul's version. But this is not to belittle the originality of the German writer, which is obviously considerable. Victor's imagination, as it ranges freely over the

implications of frozen words in a variety of situations, is the reflexion of Jean Paul's own humour and whimsicality.

So we reach the end of our survey of the literary references to frozen words. There is, perhaps, little prospect that the theme will be resumed in the literature of so critical and scientific an age as ours; but it seemed at least worth while to set on record its earlier manifestations. The reader may or may not regret its passing.

References

¹ The theme has been discussed, in great detail, and with a close investigation into the probable identity of the Antiphanes mentioned by Plutarch by O. Weinreich, in *Sitzungsberichte der Akademie der Wissenschaften in Wien. Philosophisch-historische Klasse*, Vol. 220, 1942, Pt. 4, Abhandlung.

² PLUTARCH. *Moralia*. Edited and translated by F. C. Babbitt. London, Heinemann 1927, Vol. 1, p. 421.

³ BALDASSARE CASTIGLIONE. *The Book of the Courtier from the Italian of Count Baldassare Castiglione: done into English by Sir Thomas Hoby 1561. With an introduction by Walter Raleigh*. London, 1900, p. 154 and 157.

⁴ *Ibid.*, p. 166-67.

⁵ CELIO CALCAGNINI. *Caelii Calcagnini Ferrariensis, Protonotarii apostolici, Opera aliquot*. Basileae, 1544, p. 638.

⁶ For the rest of this fable see *Œuvres de Rabelais* ed. E. and E. Johanneau. Paris, 1823, Vol. 7, p. 77-78.

⁷ V. L. SAULNIER. *Travaux d'humanisme et Renaissance*. Paris, Vol. 7, 1953, p. 233-47.

⁸ PETER HEYLYN. *Microcosmos, a little description of the great world*. 5th edition, Oxford, 1631, p. 345.

⁹ THOMAS CORYAT. *Crudities hastily gobbled up in five months travells in France, Savoy, Italy, Rhaetia. Newly digested in the hungry aire of Odcombe, in the County of Somerset, and now dispersed to the nourishment of the travelling members of this Kingdom*. London, 1611.

¹⁰ JOHN DONNE. *The poems of John Donne*, ed. Herbert J. C. Grierson. Oxford, 1912, Vol. 2, p. 129-30.

¹¹ SAMUEL BUTLER. *Hudibras. The first part. Written in the time of the late wars*. London, 1663, p. 11-12.

¹² FERNÃO MENDES PINTO, 16th-Century Portuguese author of *Peregrinação*, supposedly the story of his own travels and adventures, but with much exaggeration.

¹³ *The Tatler*. 1710-11, Vol. 4, No. 254, p. 362-68.

¹⁴ R. E. RASPE. *Singular travels, campaigns and adventures of Baron Munchausen*. London, 1948, p. 23-24.

¹⁵ JOHANN PAUL FRIEDRICH RICHTER. *Jean Pauls sämtliche Werke*, ed. H. Bach and E. Berend. Weimar 1929, Vol. 3, p. 175-76.

BRITISH FISHERY RESEARCH IN THE BARENTS SEA

BY ARTHUR LEE*

[Manuscript received 6 January 1956.]

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Introduction

Since January 1949 the Arctic Team of the Fisheries Laboratory, Lowestoft, has been carrying out fishery research from the Ministry of Agriculture, Fisheries and Food Research vessel *Ernest Holt*†, an Arctic-type trawler specially built and fitted out so that hydrographic and biological observations can be made on the Arctic fishing grounds throughout the year. At the time of writing the naturalists in the Arctic Team consist of Michael Graham (Leader); G. C. Trout and R. J. H. Beverton (Population studies); J. Corlett and P. T. Marshall (Plankton); Arthur Lee and H. W. Hill (Hydrography); R. W. Blacker (Benthos). I wish to thank my colleagues for allowing me to draw freely on their work which is in preparation for publication, and for contributing the illustrations to this article.

Between seven and nine voyages, each lasting on the average about four weeks, have been made every year. All but two of these have been to the Barents Sea, particularly the Bjørnøya (Bear Island)–Spitsbergen area; the exceptions were in 1952 when Jan Mayen Island and Greenland were visited. As a result, the ship has worked stations in localities as far apart as south-east Greenland and north-west Spitsbergen (lat. 80° 38' N., long. 13° 21' E.).

The vessel, the programme of research, the techniques and scientific gear used and the cruises made in 1949–50 have all been described in detail by Graham *et al.*,¹ while a more general account of the methods of running the research programme, both ashore and afloat, has been given by Graham.² This article reviews the progress made up to the end of 1955, the total number of voyages having now passed the half-century mark. The work has been concerned primarily with the cod (*Gadus callarias*), which makes up the bulk of the English distant-water catch, but attention has also been paid to the haddock (*Gadus aeglefinus*), and the plaice (*Pleuronectes platessa*). The cod studies have dealt with three main problems.

* Fisheries Laboratory, Lowestoft.

† See photograph facing p. 180.

The distribution of cod in relation to environmental factors

The first problem was to see if there are any factors, hydrographic or biological, that can be used as an aid to more effective fishing in order to reduce the length of voyage of commercial trawlers, thereby improving the



Fig. 1. Barents sea fishing areas. The names are those agreed at a meeting held in Bergen in July 1955. They are for provisional use by English and Norwegian fishery research workers.

quality of the catch when landed, while maintaining the quantity. A more direct method of getting better fishing at first appeared to lie in the improvement of fishing gear and fish-detecting devices, such as echo-sounders, but unfortunately significant improvement in echo-sounding technique has only been possible within the past year with the introduction of the cathode-ray tube method of presentation into British sounders. Cushing and Richardson

have shown that with this form of presentation aboard the *Ernest Holt* it is possible to count the signals coming from the fish within the five fathoms immediately above the sea-bed, and to predict the size of the catch from the figure obtained. This finding, besides being of great importance to commercial fishermen, provides a valuable research tool in that research vessels can now undertake surveys of the fish distribution over a wider area, and in finer detail, than by using a trawl as the method of survey.

The environmental factor which has been most closely studied is temperature. When the programme of research was drawn up in 1948 it was known from the work of Thompson⁴ that the cod in the Newfoundland area were found in certain temperature ranges, and it was decided that an examination of the relationship between the distribution of cod and the distribution of temperature in the Bjørnøya region would probably be the most profitable line of attack. The work carried out in 1949-50 was directed to this end and the results have been reported by Lee.⁵ He showed that paying catches of cod, that is more than 1½ tons per hour, are not taken in water with a temperature below 2° C., except in July to September when the cod sometimes enter very cold water in order to feed on the capelin (*Mallotus villosus*) and krill.

In May to June, immediately prior to the feeding season, and again in October to December, the months after, the distribution of the cod is particularly interesting. At these times the immature cod are often caught at rates as high as 15 tons per hour on the Bear Island Bank, and the fish are found to be localized where the water on the sea-bed is between 2° and 4° C., along the boundary between warm Atlantic water and the cold Arctic water. The concentration of the cod seems to increase as the width of the 2° to 4° C. zone decreases. In addition, the cod are often found to be concentrated in pockets of warm water on the sea-bed more or less surrounded by water below 2° C., and sometimes also roofed in by it. Surveys with the new type of echosounder suggest that the fine details of the cod distribution may also be controlled by temperature.

The position of the boundary zone between the Arctic and Atlantic water, which plays such an important part in localizing the cod distribution, undergoes an annual cycle, but its position in any one month varies from year to year. An attempt is being made to analyse the factors controlling its position with a view to being able eventually to forecast it. The two most important factors are first the advection of warm and cold water into the area by the West Spitsbergen and Bear Island Currents respectively, and second the amount of cold bottom water formed by winter cooling.* Both depend upon meteorological conditions. The latter is difficult to assess, as different amounts of cooling take place in various parts of the Barents Sea, producing water which either sinks directly or cascades from the tops of banks down the slopes to fill the deeper parts of the basins. These eventually overflow and there is transport from one basin to another across sills, so that it is possible

* The West Spitsbergen Current follows the edge of the continental shelf. In Fig. 1 one could take it as flowing from the Vesteraalen Grounds to Sjubre Bank, and the Bear Island Current as flowing from the Hope Island Banks to Bear Island Bank.



Fig. 2. Temperature and fishing. After experience in 1949 and 1950 there was little doubt that the front between cold and warm water was favourable for fishing, west of Bjørnøya. The results of the voyage illustrated here carried the rule to Vestspitsbergen. Also the width of the favourable zone was found to be significant.

for cold water from the eastern Barents Sea to reach the deep channel south of Bjørnøya. These movements could be more easily understood if the bottom topography of the Barents Sea were better known. The *Ernest Holt* makes new soundings whenever possible. The amount of cold bottom water formed by winter cooling is also linked with ice formation in the Barents Sea. Cold bottom water is only formed in areas where the water column is more or less homohaline, thus allowing a complete vertical circulation. Sometimes, in late autumn and early winter cold, low salinity water spreads west and south from the Bear Island Bank over warm, salty Atlantic water. As a result, a marked density discontinuity is set up at about 50 m. depth, and this limits cooling by convection to the surface layer, so that sea ice is readily formed but cold bottom water is not.

The behaviour of the immature cod in winter is not so well-known, but it is believed that the fish are mainly in the Atlantic water in the deep channel between Norway and Bjørnøya, and that they only come on to the Bear Island Bank when this warm water impinges upon it. This certainly seemed to be the case in 1954, a year in which extremely warm bottom conditions prevailed. Further research into the wintering grounds of the cod is to take place in 1956, when the *Ernest Holt* and the Norwegian Research Vessel *G. O. Sars* will carry out a joint cruise.

Furthermore, the environmental factors controlling the distribution of the cod in summer are still being investigated. In 1951 the hypothesis was formulated that as the ice limit retreated north-eastwards from Bjørnøya during the summer, so there was seasonal, wave-like movement of phytoplankton production which was followed in turn by the other factors in the food chain: zooplankton, capelin and cod. This hypothesis arose from two successive cruises in 1951 which showed a movement to the north-eastward behind the ice edge of a midwater sonic scattering layer caused by organisms thought at the time to be mainly capelin, but now known to include cod as well. Little work could be carried out to test this hypothesis in 1952 as the *Ernest Holt* was diverted to Greenland waters, but in 1953 the hypothesis was fully tested. All the predicted links in the chain were found to move north-eastwards, but the concentrations of feeding cod found in previous years were absent. In 1954 the capelin was missing from the chain, probably because this was an abnormally warm year hydrographically.

The rapid outburst of phytoplankton close to the retreating ice edge has been studied in connexion with this hypothesis. Gran⁶ noted that the phytoplankton blooms earlier in the coastal water near the Norwegian and Russian coasts and in the Arctic water near the ice edge, than in the Atlantic water. Recent work by Sverdrup⁷ has shown that the vernal blooming at "Ocean Weather Station M" in the Norwegian Sea does not occur until the depth of the homogeneous surface layer in the water column is less than a certain critical depth which depends upon the amount of incoming radiation. The observations made by the *Ernest Holt*, although not so continuous and precise as those at "Ocean Weather Station M", suggest that the vernal blooming in the Barents Sea is triggered by a similar mechanism. Near the ice edge, and in the

coastal water, a shallow surface layer of low salinity often lies over high salinity water in spring and early summer, giving a marked halocline at a depth less than Sverdrup's critical depth. This low salinity water is due to melting in the case of the ice edge, and run-off from the land in that of the coastal water. The Atlantic water, on the other hand, does not develop a shallow surface homogeneous layer until much later in the summer when the summer heating gives rise to a thermocline.

Effect of the trawl fishery on the Arcto-Norwegian cod stocks

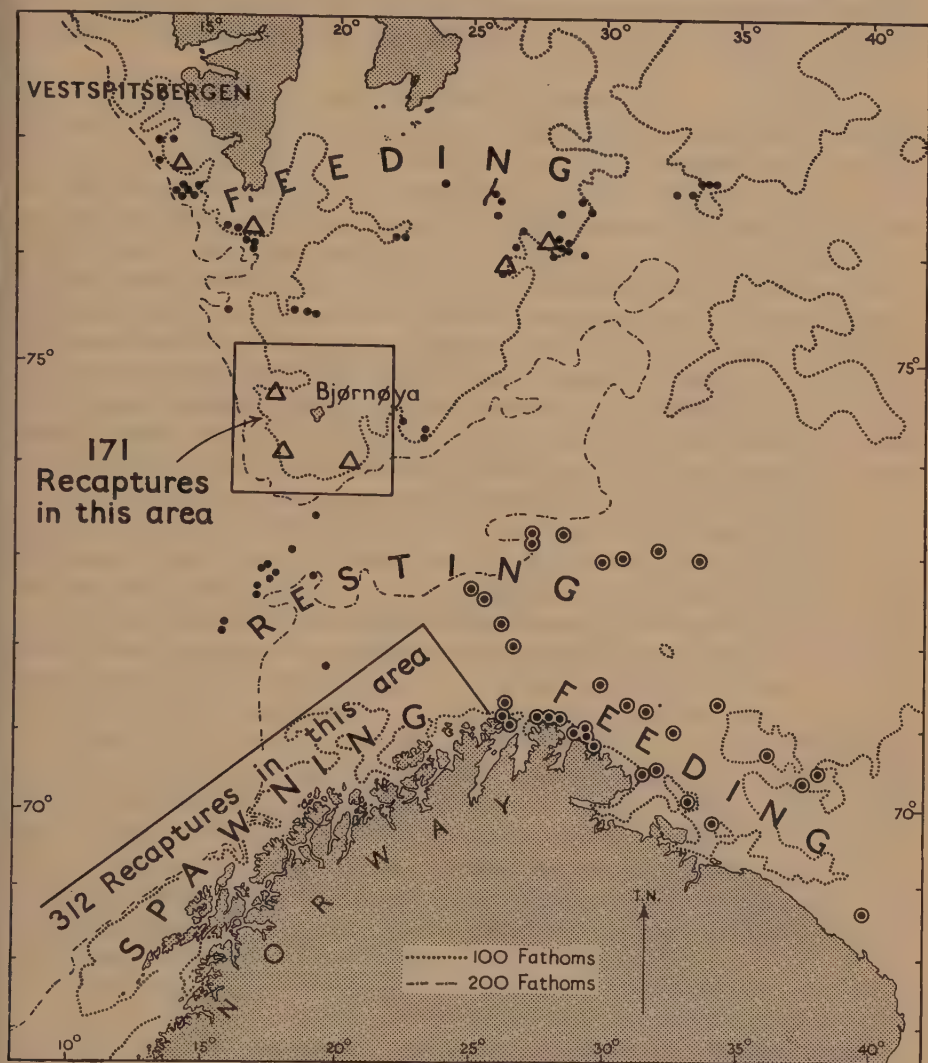
Marking experiments carried out in 1937-39 showed that the immature cod caught at Bjørnøya, and the mature fish taken at the Lofoten Islands during the great Norwegian spring fishery, were both parts of the same stock. The second problem therefore has been to see if the British trawl fishery at Bjørnøya is having an adverse effect upon the cod stocks, and so upon the Lofoten fishery. Population studies to this end have gone on steadily since 1948. They have taken the form of marking experiments from the *Ernest Holt* and of sampling the cod for age, length and otolith type, both at sea and on shore, at the fish markets of Grimsby and Hull where the majority of the distant-water catch is landed. The marking experiments have confirmed those of 1937-39. They also show that, after spawning, the mature fish tend to travel downstream in the North Cape Current rather than in the West Spitsbergen Current, thus appearing in the fisheries of the south-eastern Barents Sea but not in those of Bjørnøya and Spitsbergen. Furthermore, they provide confirmation of the evidence of studies of the types of otolith found in the Arcto-Norwegian cod stock. These have shown that there is some degree of localization in the cod populations found on the east and west sides of the Bear Island Bank respectively.

The percentage of marked fish returned provides an assessment of the effect of the trawl fishery upon the stock. For fish below 60 cm. in length the percentage returned is low, probably because they are hosed overboard by the fishermen with the fish which are rejected as being too small to save. The percentage of returns of cod above 60 cm. is steady and indicates that the trawl fishery takes about 20 per cent of the fish of this size in the area each year. For the even larger cod which spawn at Lofoten the percentage caught in a year is 40.

Effect of climatic fluctuations upon the fish stocks

The final problem is concerned with the analysis of the effect of climatic fluctuations upon the fish stocks, as the rise of the British distant-water trawl fishery since 1925 has been associated with the pronounced amelioration of climate in recent decades in the Arctic and sub-Arctic regions. This fishery now yields about 400,000 tons of demersal fish each year, two-thirds of the total catch of trawled fish landed in England and Wales, and worth over £18,000,000 when first landed. It is therefore desirable to be able to advise the distant-water fishing fleets in the event of a climatic recession.

The recent climatic improvement in the Barents Sea region has affected the fishery in two ways. First, it has brought about a retreat of the ice edge, which has allowed the trawler fleets access to new grounds and has lengthened the



△ Positions of liberation of marked cod.

• Positions of recapture of marked cod.

⊙ Positions of recapture of marked cod whose size indicates sexual maturity.

Fig. 3. Identity of Bjørnøya cod. The immature cod of the Spitsbergen Shelf are part of the stock which breeds off Norway, and after spawning they do not necessarily return to the shelf region, but instead feed or rest to the eastward of the spawning area. This chart shows the results of tagging experiments carried out in 1951-52. Positions of liberation of marked cod are shown by triangles: recaptures are shown by black dots. Recaptures of cod whose size indicates sexual maturity are denoted by ringed black dots.

time when the area can be fished. Second, it has brought about an improvement in the cod stocks. This is shown by the fact that since the fishery began the catch per unit effort of British vessels has increased by an amount greater than can be accounted for in terms of improved ships and fishing gear; it is, in addition, confirmed by the increase in the yield of the Lofoten fishery since 1920.

The study of the effect of environmental factors upon the distribution of cod has shown that the effect of the climatic fluctuation upon the adult cod is probably only slight. Although air temperatures in the region have risen sharply, physical considerations show that the corresponding rise in sea temperature can only be small. The analysis of the sea temperature observations that do exist is not easy as they have not been collected systematically, mainly owing to the difficulties in making hydrographic observations throughout the year in this area. Surface temperatures in the Norwegian coastal area appear to have risen by about $\frac{3}{4}^{\circ}$ C. since 1915, but an examination of the subsurface temperature in the West Spitsbergen Current has not revealed any significant trend. It has been made difficult not only because the number of observations is small, but because the observations made in this current by the *Ernest Holt* show that at any one time the temperature can vary greatly over quite short distances, and also that the annual cycle of events is irregular.

In this connection it is interesting to note that studies of the benthos of the region appear to show small changes in the water temperature that are not revealed by the limited hydrographic data available. Comparing the collections of benthos by the *Ernest Holt* with those made by various expeditions before 1931, it is possible to trace a marked spread of Atlantic species northwards along the west coast of Spitsbergen and a corresponding decline of Arctic species at Bjørnøya. The rise in the number of Atlantic species on the Bellsund and Hornsund Banks is particularly noteworthy, and it may be profitable to carry out further research to see if it is connected with a decrease in the strength of the East Spitsbergen Current. The August limit of sea ice to the east of Spitsbergen for the period 1929–38 was about 150 miles farther north than the August limit for the period 1898–1928, although the limits for April, May and June show little change between the two periods. It appears that the source of the East Spitsbergen Current has been displaced considerably northwards, and this might be expected to lead to a decrease in the amount of cold water rounding Sörkapp in summer.

A hypothesis at present under test is that the increase in fish stocks has been mainly due to such changes in the environmental conditions as have increased the chances of survival of the eggs and larvae of the cod. Improved conditions are found at three stages in the early life of the cod. The first is at spawning. Low temperatures are known to be lethal to the eggs and larvae, and it is thought that a small rise in temperature could increase the effective area of the spawning grounds and displace the centre of spawning northwards by bringing marginal northern grounds into use.

The second stage occurs when the transport of the larvae from the spawning

grounds on the Norwegian coast to the nursery grounds on the Bear Island-Spitsbergen Bank is effected by the West Spitsbergen Current. When the current is strong the larvae would be expected to reach the nursery grounds quickly and so be in a large area with ample food early in life. When the current is weak, on the other hand, the fry would remain close to the spawning grounds in a small area of dispersion that would quickly become over-populated and so give rise to a high mortality. The strength of the West Spitsbergen Current has been assessed from a hydrographic section that cuts across it west of Bjørnøya. This section has been worked twenty-five times by the *Ernest Holt* since 1948, and the volume transport northwards across the section has been calculated for each occasion. The transport has been found to vary greatly, and an attempt is now being made to see if it is related to the atmospheric circulation, in particular to see if it varies directly with the southerly wind component over the area during the period immediately preceding the working of the section. If this can be established, part of the mechanism whereby the recent climatic fluctuation has affected the cod stocks will be revealed, because a significant feature of the fluctuation is the increase in the northwards transport of air from the North Atlantic towards the Norwegian Sea.

Finally, improved conditions might occur on the nursery grounds. Stronger currents would carry the larvae farther and so open up marginal nursery grounds, but in addition there is the possibility that the food supply has improved. Variations from year to year in the amount of zooplankton available have been observed. For example, Corlett⁸ has reported that the standing crop was much higher in 1949 and 1950 than in 1951 and 1952. The respective causes of good and bad plankton years await investigation.

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MAPPING THE FALKLAND ISLANDS DEPENDENCIES

BY PETRA LEAY¹

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Summary

It is just ten years since the Directorate of Colonial Surveys became responsible for the production and publication of maps of the Falkland Islands Dependencies; in this account it is proposed to give a description of the work completed and an outline of the future programme.

"Operation Tabarin", inaugurated in 1943, marked the re-establishment of British occupation and scientific activity in the region and included in its policy a programme of continuous scientific investigation within the area between 20° and 80° W. This venture later became known as the Falkland Islands Dependencies Survey, or F.I.D.S. It is in co-operation with F.I.D.S., and more particularly with the surveyors who work at the Directorate for several months on their return from the Antarctic, that the compilation and plotting of a systematic series of medium scale maps has been possible. In 1951 an article² was published in this journal giving a full description of the type of survey undertaken, the methods and the instruments used and a brief summary of the maps published and planned.

At first the need was for maps for planning and other non-scientific purposes, but since 1951 the emphasis has moved towards the larger scales which are required principally as a basis for scientific work as well as for general use within the Dependencies. Between 1948 and 1950 a series of maps covering most of the area north of 75° S. was published at 1:500,000, and this is still the most useful scale for gaining a general picture of the topography. In 1953 work began on a series of maps covering a similar area to be published at 1:200,000. During the last ten years maps have been compiled at scales ranging from 1:9 million to 1:15,000, many of which have been printed and issued for general purposes, while others have been produced to illustrate specialized reports on, for example, meteorology in the Dependencies. It is not, however, proposed to include a detailed summary of these maps here, the following description covers only those maps which are on sale to the public or which form part of a systematic series.

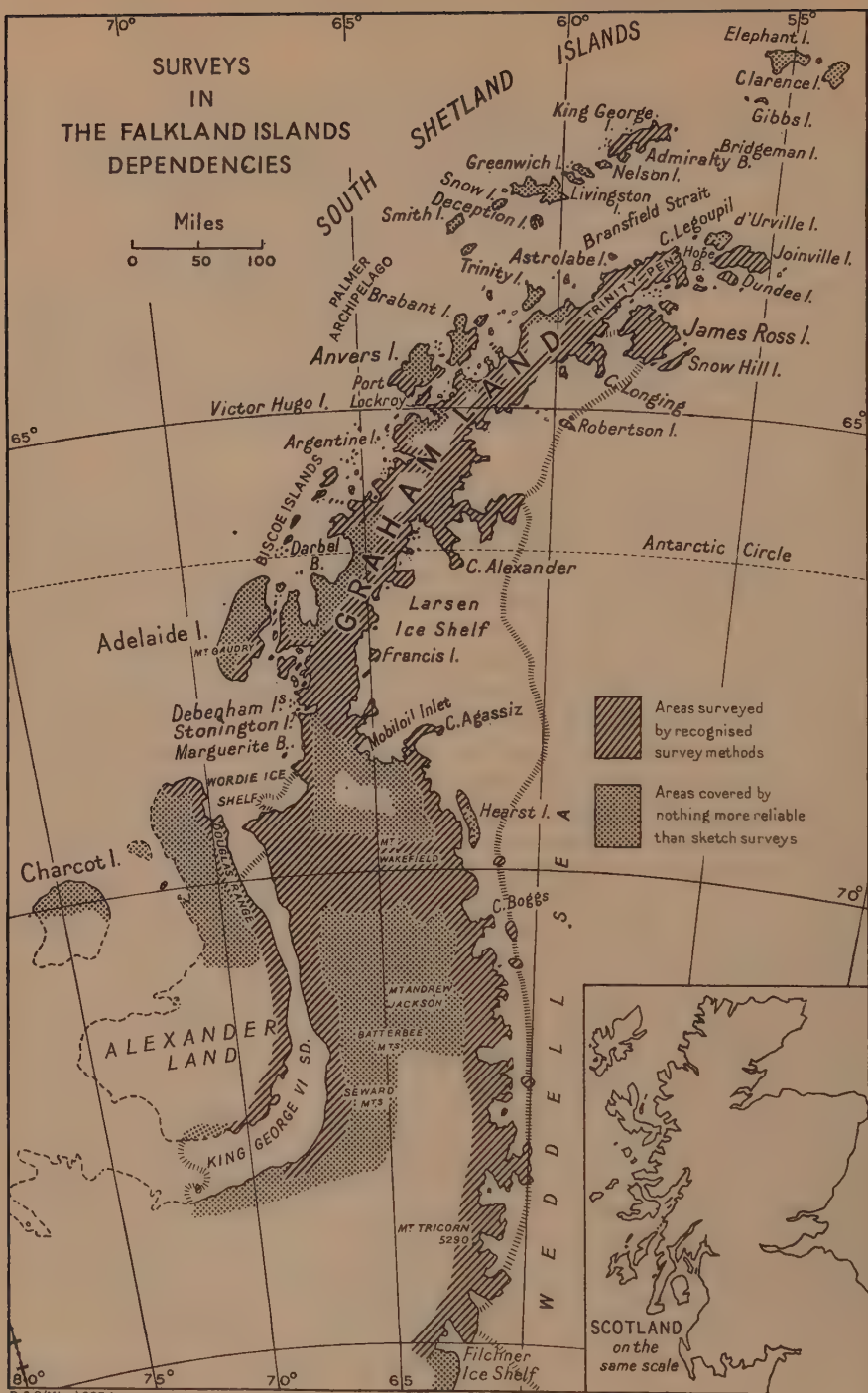
¹ Directorate of Colonial Surveys, Tolworth.

² A. Stephenson. Surveying in the Falkland Islands Dependencies. *Polar Record*, Vol. 6, No. 41, 1951, p. 28-44.

Compilation

On completing their tour of eighteen or thirty months in the Antarctic and their work at the Directorate of Colonial Surveys, the F.I.D.S. surveyors hand all their survey data, field books, field sketches and final compilations to the Directorate. A copy of their survey report is also kept at Tolworth—the new home of the Directorate since 1951. In drawing these maps for publication the Directorate relies almost entirely on the surveyor's final compilation and not, as is the case with most parts of the world, on his field books and computations. This may seem unconventional but it has been proved that the F.I.D.S. surveyor, who is expected to perform a host of other duties besides his actual surveying and to work under arduous conditions, cannot produce all his data in a strictly orthodox form, and this being so he is the most suitable person to interpret his work.

The compilation material itself falls roughly into two divisions: the maps produced by acknowledged survey methods, though these may not necessarily be particularly accurate, and those, generally at a much smaller scale, compiled from sketches, photographs and earlier maps, sometimes suitably embellished with flights of cartographic fancy. Maps of this second category are rejected wherever possible but when no other material exists they must be used. It will be appreciated that a note pointing out the different material used is an essential part of any map compiled on these lines. Within these two divisions are two further divisions. Each surveyor or compiler usually breaks down his work into the more and the less reliable, usually by showing the latter with a broken line. These further divisions are relative only to the average accuracy of the particular map in question, and a pecked contour on a map produced by survey methods may be very much more accurate than a continuous contour on an unsurveyed "compilation". This is easily shown on a map comprised of one survey but it is extremely difficult to convey the true picture on a map which is compiled from a dozen or more sources of both classes of work, though this situation is by no means unusual even on scales as large as 1:200,000. Furthermore, it is only with some experience that it is possible to assess the relative values of maps compiled by the sealing captains and explorers of the nineteenth and early twentieth centuries, although in fact some of these are still more accurate than maps produced in recent years. It should also be realized that with the present methods of survey and the policy of continuous activity on the part of F.I.D.S. a map often becomes out of date as soon as it is published; for example Sheet 66.60 covering Jason Island was published only a few days before a party re-surveying part of the area reported that the so-called island was joined to the mainland by a low col. Each year new surveys are made, which can be a great source of frustration to the compiler if it is not considered in perspective. The following paragraphs give a more detailed account of the maps produced by the Directorate.



INDEX TO 1:200,000 MAPS
OF
THE FALKLAND ISLANDS
DEPENDENCIES

Miles

0 50 100



Each sheet is numbered by the geographical co-ordinates of the north-east corner



Small scale maps

Two general maps covering the Dependencies have been published as well as an index map (D.C.S. Misc. 101) to the medium scale series:

1:9 million (D.C.S. 960) is a small map published in five colours for inclusion in the *Colonial Office List Map Supplement* and the *Colonial Office Report on the Falkland Islands and Dependencies*. It covers the region as far as 80° S., and has been revised several times; the latest edition, issued in October 1955, is on sale to the public, price 1s.

1:6 million (D.C.S. Misc. 10) is a large map covering the whole of the Dependencies and neighbouring seas. It was published in March 1949 in three colours and is on sale to the public, price 5s.

These two maps have been compiled from larger scale surveys and are correct up to the date of publication.

Medium scale maps

1:500,000. This series (D.C.S. 9 and 701) was first planned in 1946 and involved a great deal of initial work in assessing material and referring innumerable queries to individuals with local knowledge. Sheets A to L give a total cover of the peninsula of Graham Land and off-shore islands as far south as 75° S., and three separate sheets cover South Georgia, the South Sandwich Islands and the South Orkney Islands. These maps are printed in four colours; on each sheet there is a brief outline of the authorities used and a diagram showing the reliability estimated in five categories. They are on sale to the public, price 3s. (2s. for South Georgia and the South Orkney Islands).

A new series, also in several colours, at 1:500,000 is planned to cover the whole of the Dependencies and to supersede this series. The sheet lines and numbering system will be changed to fall more in line with international convention and to enable the sheets to be used more easily at the junction with territories outside the Dependencies. For the area north of 75° S. these sheets will be compiled from the 1:200,000 series now in progress, and for the region south of this they may include surveys by the Trans-Antarctic Expedition and the Royal Society Antarctic Expedition to Coats Land for the International Geophysical Year.

1:200,000. Twenty-two sheets on a systematic sheet line system (as on Map 2) were produced by direct photographic reproduction from surveyors' compilations and were printed, in black only, prior to 1951. They cover areas in the north of Graham Land, the South Shetland Islands and the south-east coast of the peninsula, and were produced rapidly in order to provide basic maps for recording scientific data. The sheets were never on sale to the public and they have all now been superseded.

In 1953 work commenced on preparing a new 1:200,000 series (D.C.S. 601) for publication. This now forms the basic scale (except in small areas where a larger scale is necessary) of the present mapping programme. The series is planned to cover the peninsula of Graham Land and off-shore islands north of 75° S. (see Map 2) and comprises about eighty sheets; the first was

published in November 1954 and 25 are now available. The present policy is to complete most of the area south of 66° S. which is at present relatively "stable" from the map compiler's point of view, and later to complete the northern section when the more recent ground surveys and the material produced by the current Falkland Islands Dependencies Air Survey are available.

The method adopted in producing this series has been as follows: all available material, including photographs and sketches as well as maps, is collected and assessed (the Directorate reckons to hold a copy of all the available maps of the area except those of purely historical interest), and from this a diagram is compiled for each area covered by a 1:200,000 sheet. Each diagram shows the actual material that should be used in compiling the map and how one item should be joined on to the next. In this way it has generally been possible to smooth out inconsistencies and disagreements between two surveys before the map is drawn. The diagrams themselves also form the basis of a "compilation diagram" on every sheet which shows the date and the expedition responsible for each survey as well as the surveyor's name. This system is less liable to error than the reliability diagrams of the 1:500,000 series, and is very much more satisfactory from the point of view of the user who can then assess the reliability himself, providing, of course, that he has a little knowledge of the history of map-making in the Dependencies. If more detail about any area is required the survey data can be inspected at the Directorate. Since these maps are primarily for use by the specialist certain other information has been shown: a few notes on ice conditions are given and selected traverse routes, particularly those from which the survey was made or those showing a route through difficult country, are plotted with dates and camp sites. The series is printed in two colours, black and blue, and is on sale to the public, price 2s. 6d. per sheet.

A provisional series at this scale comprising nineteen sheets (see Map 2) was prepared in September 1955 to complete the cover of the northern area and to make the most up to date material quickly available for use in the Dependencies. These maps have not been published but are available for consultation at the Directorate of Colonial Surveys. They also form the basis for the maps produced to show place-names by the Research Department of the Foreign Office.

1:100,000. It has been found necessary to produce a systematic cover of certain areas of the Dependencies at this scale in order to show more detail and to make it available on a larger scale as a base map for plotting geological detail, penguin rookeries, etc. About eighteen sheets were produced, like the earliest 1:200,000 maps, by direct photographic reproduction from surveyors' compilations. These were printed in black but not put on sale to the public; they have now all been superseded by the 1:200,000 series which incorporates the same detail as well as the more recent surveys.

It is expected that the South Georgia Survey will complete field work on the map of South Georgia by April of this year. From this survey, which has continued for three seasons, a map will be compiled and published in three sheets at 1:100,000. Similarly, but in the more distant future, a map of the South Orkney Islands in two sheets at 1:100,000 is anticipated.

Large scale maps

As yet the only map published at a scale larger than 1:200,000 is the 1:50,000 map of Deception Island. There are, however, some large-scale surveys now being carried out in the Dependencies which, for the relatively small area they cover, will give very much more detail than can be accommodated on the 1:200,000 sheets. Whether it will be deemed worthwhile to draw and publish these surveys at a larger scale or merely to make a limited number of direct copies available to the specialist depends upon the demand.

The map of Deception Island (D.C.S. Misc. 217) was published in four colours in January 1955. It was drawn direct from a plane table survey made in 1954 by two members of F.I.D.S. This very rapid production—the field sheets were not received in this country until the middle of 1954—is due partly to the whole area being covered by one survey and therefore making unnecessary the frequently protracted task of sorting and assessing all available material.

Place-names

The selection of names to be used on all maps of the Falkland Island Dependencies is, from the Directorate's point of view, a relatively simple procedure. The Research Department of the Foreign Office, through whom are obtained the names approved by the Antarctic Place-names Committee, issues maps showing all the accepted names in the area. These maps are based on the Directorate's own compilations and other topographic surveys held at Tolworth.

Future Programme

As regards the Graham Land peninsula the immediate programme has been outlined above. At the time of writing, two Canso amphibian aircraft are operating from Deception Island under a commercial contract from which it is hoped to obtain vertical air-photography of the north-western part of the peninsula and off-lying islands, an area largely inaccessible to land parties. A depot ship is also operating from this base equipped with helicopters to assist in landing surveyors who are to provide ground control for the survey. By February this year some 1000 square miles of air-photography had been claimed and several successful helicopter landings made. It is hoped that the results from this contract and the increased F.I.D.S. activities will close the gaps in the survey, and that it will then be possible not only to complete publication of the first edition of the 1:200,000 series but also to issue revised editions incorporating subsequent work as it becomes available. The production of a second edition is a much less complicated undertaking than the production of the first, the map itself is already in existence and the survey is available to suggest any adjustments which may be necessary to fit his new survey on to the earlier work. Of the more remote and unsurveyed southern part of the Dependencies little can be said until more information is forthcoming, but it seems probable that a scale of 1:500,000 will be sufficient to cater for any surveys that are likely to be made for some time to come.

THE BRITISH TITLE TO SOVEREIGNTY IN THE FALKLAND ISLANDS DEPENDENCIES

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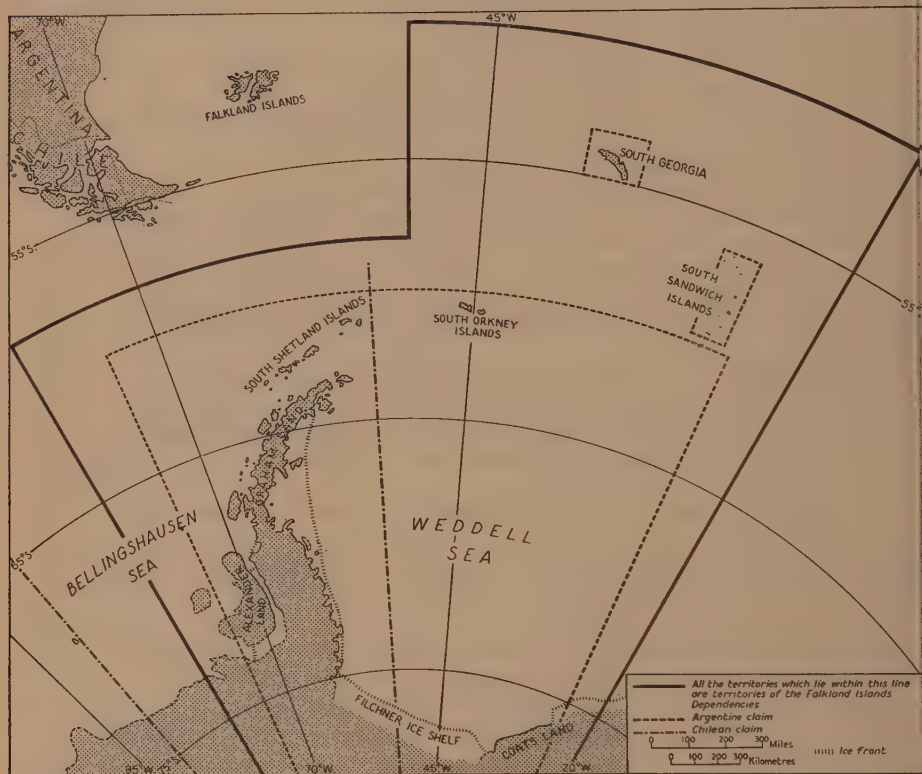
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INTRODUCTION

In an attempt to settle the dispute between the United Kingdom, Argentina and Chile over sovereignty in the Falkland Islands Dependencies, the United Kingdom made unilateral Applications to the International Court of Justice at The Hague on 4 May 1955. The Applications set out the British title, and asked the Court to declare that the Argentine and Chilean encroachments in British Antarctic territory were illegal and invalid under international law.

Both the Argentine and Chilean Governments refused to accept the

jurisdiction of the Court.* The United Kingdom Government subsequently expressed its regret at these refusals, and placed on record the fact that it had now taken every step open to it to bring about a peaceful and amicable determination of this question of sovereignty in accordance with the letter and spirit of the Charter of the United Nations. On 18 March 1956 the International Court announced that since neither Argentina nor Chile was prepared to accept the Court's jurisdiction, both cases had been removed from its list.



The boundaries of the Falkland Islands Dependencies and of the Argentine and Chilean claims. The positions of bases are shown in the *Polar Record*, Vol. 8, No. 52, 1956, p. 61.

There has recently been a marked increase of interest in the Antarctic, especially in connection with the International Geophysical Year. This has given rise to various suggestions for the international administration of the whole continent, and it has also been argued that the time has now come to divide up this "no-man's land" in order to forestall the possibility of disputes. Most of these suggestions ignore the long history of British activity and achievement in the area, as also do they ignore the history of the other sectors of Antarctica. It therefore seems desirable to record in some detail the

* For the texts of their letters see the *Polar Record*, Vol. 8, No. 52, 1956, p. 48-56.—Ed

essential facts relating to the United Kingdom's title to sovereignty in the Falkland Islands Dependencies, as set out in the Applications.

This is a legal title based on international law, and it should not be ignored in political discussions about any new territorial settlement in Antarctica. The great achievements of some recent foreign expeditions, and still more the major and spectacular activities now being undertaken by several nations, should not be allowed to obscure the fact that British sovereignty in the Falkland Islands Dependencies had been legally and peacefully secured a long time before any other nation asserted claims.

APPLICATION BY THE GOVERNMENT OF THE UNITED KINGDOM OF GREAT
BRITAIN AND NORTHERN IRELAND RELATIVE TO THE ENCROACHMENTS OF THE
GOVERNMENT OF ARGENTINA IN BRITISH ANTARCTIC TERRITORY

The following is the full text, supplied by the Foreign Office, of this Application by Sir Gerald Fitzmaurice, Agent for the Government of the United Kingdom, to the Registrar of the Court. All footnotes are from the original text:

I have the honour to refer to Article 40 (1) of the Statute of the International Court of Justice and Article 32 (2) of the Rules of Court and, by direction of Her Majesty's Principal Secretary of State for Foreign Affairs, to submit an Application instituting proceedings in the name of the United Kingdom of Great Britain and Northern Ireland against the Republic of Argentina in the following case.¹

2. Differences have existed between the Governments of the United Kingdom and of the Republic of Argentina for a number of years, concerning pretensions advanced by the Republic in 1925, and at various dates thereafter, to the sovereignty of certain Antarctic and sub-Antarctic territories which belong to the United Kingdom under prior, long-standing, and well-established legal titles, dating from, at latest, the period 1775-1843. The territories in dispute between the two countries form part of the Falkland Islands Dependencies, consisting of already existing British possessions, which (following on a long series of analogous enactments—see paragraph 13 below) were proclaimed as such and formally placed under the administration of the Government of the Colony of the Falkland Islands by Royal Letters Patent of July 21, 1908. These Letters Patent, the full text of which is set out in Annex 1 (No. 1) to the present Application, specified as the principal territories included within the Dependencies the territories known as South Georgia, the South Orkneys, the South Shetlands and the South Sandwich Islands, and the territory known as Graham Land. There were also other territories, such as Coats Land. Further Letters Patent of March 28, 1917 (Annex 1, No. 2), were issued for the purpose of clarifying the extent of the Antarctic mainland together with its coastal archipelagos which were comprised within the designation "territory of Graham Land" used in the earlier Letters Patent. Under the supplemental Letters Patent of 1917, the Dependencies were finally defined to include—

"all islands and territories whatsoever between the 20th degree of West longitude and the 50th degree of West longitude which are situated south of the 50th parallel

¹ It results from the present Application that the United Kingdom Government accepts the jurisdiction of the Court in respect of the questions hereby submitted to it, and in particular that of the title to sovereignty over the islands and lands of the Falkland Islands Dependencies. The present Application does not constitute a submission to the jurisdiction of the Court in any other respect, or as regards the title to sovereignty over any territory outside the Dependencies.

of South latitude; and all islands and territories whatsoever between the 50th degree West longitude and the 80th degree of West longitude which are situated south of the 58th parallel of South latitude.”

The territories of the Dependencies, as so defined in the Letters Patent of 1908 and 1917, which had long been British possessions, have for many years been utilised and administered by the Falkland Islands Government effectively, openly and, until modern times, without any objection from the Republic of Argentina, which facts are conclusively shown in paragraphs 6 to 25 below.²

3. Notwithstanding the United Kingdom's open assumption, and long-standing and peaceful exercise of sovereignty over the territories concerned, and the clear and precise delimitation of the Falkland Islands Dependencies in the above-mentioned Letters Patent, the Government of the Republic of Argentina formulated pretensions in 1925 to the South Orkneys, in 1927 to South Georgia as well as to the South Orkneys, and in or about 1937 to *all* the territories of the Falkland Islands Dependencies. Subsequently, the Republic of Argentina, in a notice of claim deposited on Deception Island (South Shetlands) in January, 1942, and in a Note addressed to the United Kingdom Government on February 15, 1943, defined her pretensions in the area south of latitude 60° South as covering all Antarctic lands and dependencies between longitudes 25° and 68° 34' West. This westerly limit was later extended by a decree of September 2, 1946, to longitude 74° West. Thus, the pretensions which Argentina has from time to time formulated to territories in the Falkland Islands Dependencies appear to cover South Georgia and the South Sandwich Islands as well as the islands and lands situated between 25° and 68° 34' West and south of latitude 60° South.

4. South of latitude 60° South, the western limit of Argentina's pretensions, as given in the above-mentioned decree of September 2, 1946, is longitude 74° West: whereas the western limit of the Falkland Islands Dependencies is 6° further to the west at longitude 80° West. The United Kingdom's present Application does not therefore, relate to the areas of the Falkland Islands Dependencies between longitudes 74° and 80° West, which lie outside the declared limits of Argentina's pretensions. Similarly, the eastern limit of Argentina's pretensions, as stated in Argentina's above-mentioned notice of claim, and diplomatic Note of February 15, 1943, is longitude 25° West, whereas the eastern limit of the Falkland Islands Dependencies is 5° further to the East at longitude 20° West. The United Kingdom's present Application does not, therefore, relate to the areas of the Falkland Islands Dependencies between 25° and 20° West, which lie outside the declared limits of Argentina's pretensions. It follows that the United Kingdom's complaint in the present Application relates to the pretensions of Argentina to the sovereignty of the islands and lands of the Falkland Islands Dependencies which lie between longitudes 25° and 74° West and to the southwards of latitude 60° South. A map depicting the territories to which the United Kingdom's present Application relates is attached as Annex 2 [see p. 126]. As this map shows, the principal territories in dispute between the United Kingdom and Argentina in the present case are the South Sandwich Islands, South Georgia, the South Orkneys, South Shetlands, and Graham Land together with its coastal archipelagos. There is also Coats Land, to which (at Vahsel Bay) the Argentine Government has, during the last few weeks, sent an expedition.

5. The main facts relative to the United Kingdom's titles to the sovereignty of the Falkland Islands Dependencies and the territories comprised in it, and to the violation of her sovereignty by the Republic of Argentina, are set out in paragraphs

² It will be understood that although, for reason of convenience, the territories to which the present Application relates were constituted Dependencies of the Falkland Islands for administrative purposes, the British *title* to them is a separate and independent one, which in no way derives from or depends on the title to the Falkland Islands themselves.

6-33 below.³ The United Kingdom Government considers that the facts stated in the present Application suffice to establish conclusively both the United Kingdom's title to sovereignty, and the violation of that sovereignty by the Republic of Argentina. The United Kingdom Government reserves the right, however, to amplify in its pleadings its exposition of the relevant facts, and to furnish further proof of both these matters.

*Origins of the British titles, historic discoveries and acts of annexation by
British nationals in the period 1675-1843*

6. The British title to the territories concerned goes back to a number of dates varying from, at latest, 1775 to 1843. The first discovery of any of the islands or lands of the Falkland Islands Dependencies may well have been that of *South Georgia* in 1675 by the British merchant Anthony de la Roche. This group of islands was rediscovered in 1775 by the great English navigator Captain James Cook, R.N. On January 17 of that year he landed at three places on the island, took possession of it formally in the name of King George III and called it South Georgia in honour of the King.

7. Captain Cook also discovered the *South Sandwich Islands* in 1775. Sailing eastwards from South Georgia, he sighted first a small group of islands which he called the Clerke Rocks after the name of his lieutenant, and then, on January 31, a larger group which he called the Sandwich Land after the First Lord of the British Admiralty of that date.

8. The *South Shetland Islands* were discovered by the English sea captain William Smith on February 18, 1819. Revisiting the islands in October of the same year, he landed, planted the British flag and formally took possession of the group in the name of King George III, calling it New South Britain—(this was afterwards changed to South Shetlands, named after the Shetland Islands, north of Scotland). A few months later, Edward Bransfield, R.N., accompanied by William Smith, proceeded again to the islands and made a survey of the whole group. On January 16, 1820, he landed on the largest island (King George Island) in the centre of the group and took possession formally in the name of King George IV. After a voyage south-westwards between the South Shetlands and Graham Land, to which further reference is made in paragraph 10 below, he returned to the South Shetland Islands. On February 4 he landed on the most easterly island of the group, taking possession formally in the King's name and calling the island Clarence Island in honour of the Duke of Clarence, the brother of the King.

9. The *South Orkney Islands* (named after another Scottish group) were discovered by the British sealing captain, George Powell, on December 6, 1821. On the following day he landed on the largest of the islands, took possession of it formally in the name of King George IV and called it Coronation Island in honour of the King's coronation.

10. *Graham Land*, the northern extremity of the Antarctic continent, was first discovered on January 30, 1820, by E. Bransfield, R.N., in the course of the voyage of exploration south-westwards from the South Shetlands which was mentioned in paragraph 8 above. He sighted, in hazy weather, the outline of parts of the Antarctic mainland and one or two coastal islands. He named the land Trinity Land in compliment to the Board of Trinity House (the British institution responsible for pilotage and maritime lights), and he named two of the coastal islands, Hope Island

³ The description of the origin of the British titles and of their subsequent consolidation by occupation, usage, administration and other means appropriate to the circumstances of the territories, as contained in paragraphs 6-25 and 30-31 hereof, are substantially identical with the corresponding passages in the Application which the United Kingdom Government is making concurrently with the present one, complaining of violations of its sovereignty over the same area, on the part of the Republic of Chile.

and Tower Island, respectively. He also traced the outline of the Antarctic mainland and coastal islands, as he had seen them, on the chart which he drew of the South Shetlands and forwarded to the British Admiralty. Soon afterwards, further sightings of the Antarctic peninsula or its coastal islands were reported by British and American sealers, by the Russian navigator Admiral Bellingshausen, and by the French navigator, Captain d'Urville, but the first sighting was that of E. Bransfield, R.N. In 1829, Captain H. Foster, R.N., in H.M.S. *Chanticleer*, effected a landing on one of the coastal islands, Hoseason Island off west Graham Land, and deposited there a copper cylinder in which was a document taking possession in the name of King George IV. On February 21, 1832, the British sealing captain, John Biscoe, landed on an island of the Palmer Archipelago, believing it to be part of the mainland, and took possession formally in the name of King William IV, calling the territory Graham Land, by which name the peninsula is known to-day, in honour of Sir James Graham, then First Lord of the British Admiralty. On January 6, 1843, Captain J. C. Ross, R.N., commanding H.M.S. *Erebus* and H.M.S. *Terror*, penetrated into a gulf on the eastern side of the peninsula and landed on a coastal island. He named the gulf Erebus and Terror Gulf, and the island James Ross Island, and took possession of the island together with its "contiguous lands" for the British Crown.

11. The first discoveries of South Georgia, the South Sandwich Islands, the South Orkneys, the South Shetlands, and Graham Land were thus all made by British nationals—a fact reflected in the names given to these territories by which they have been known, and have figured in maps and charts, ever since. The same applies to Coats Land, as to which see paragraph 14 below. Some discoveries of particular parts of these principal groups of territory were made by explorers or seamen of other nationalities; but the initial discoveries of all five principal groups were British. There were no Spanish or Argentine discoveries. Furthermore, during this early period in Antarctic history from 1675 to 1843, acts of annexation were performed in the name of the British Crown at places ashore within all the principal groups except the South Sandwich Islands, where, frequently, the local conditions render landing impossible. On the other hand, during this period no acts of annexation were performed in any of the territories concerned on behalf of any other State.

12. The facts stated in paragraphs 6 to 11 above show that from very early dates varying between 1775 and 1843, Great Britain possessed, on the basis of discovery, accompanied by a formal claim in the name of the British Crown, an original root of title to all the territories concerned.

*Display of British sovereignty in or in regard to the Falkland Islands
Dependencies in the period 1843 to July 21, 1908*

13. In pursuance of a British Act of Parliament (6 Victoria, Chapter 13—*British and Foreign State Papers*, Volume 31, page 1211), Royal Letters Patent were issued on June 23, 1843, making provision for the government of the "Settlements in the Falkland Islands and their Dependencies" (Annex 1 hereto, No. 3). Supplemental Letters Patent were issued on April 28, 1876, making further provision for the government of the "Settlements in the Falkland Islands and their Dependencies." On February 25, 1892, fresh Letters Patent were issued by which the Government of the "Settlements in the Falkland Islands and their Dependencies" was designated as the Government of a Crown Colony (*British and Foreign State Papers*, Volume 84, page 262). Similarly, the Commission issued to the new Governor in November, 1847 (Annex 1 hereto, No. 4), and the ten succeeding Commissions to Governors issued between that date and 1908, were in the form of an appointment covering "the Falkland Islands and their Dependencies." Again, numerous laws passed by the Falkland Islands Government during the period 1843–July 21, 1908, were made

for "the Falkland Islands and their Dependencies."⁴ The particular territories comprised in the "Dependencies of the Falkland Islands" were not named in the various Letters Patent, Governor's Commissions, or laws of the Falkland Islands Government. The *Colonial Office Year Book*, however, began in 1887 to specify South Georgia as one of the Dependencies. There had been comparatively little whaling and similar activity in the Antarctic in the middle of the nineteenth century, but from 1892 onwards whaling, sealing and scientific exploration began to revive. This renewed activity called for a corresponding exercise of State authority in the Antarctic and led very soon to special provision being made by Great Britain for the government of the five principal territories as Dependencies of the Falkland Islands and to their formal constitution as the Falkland Islands Dependencies.

14. The Antarctic revival in the area now in dispute began with the voyage of four Scottish vessels in 1892 to the eastern side of Graham Land and the Weddell Sea for whaling and sealing. In the same year a Norwegian whaling expedition which went to the Weddell Sea, called at the South Orkneys, and further Norwegian expeditions in 1893 and 1894 visited the South Shetlands and Graham Land. In 1897 and 1901 respectively, Belgian and Swedish scientific expeditions went to the South Shetlands-Graham Land area, and in 1902 they were followed by a Scottish scientific expedition under Dr W. S. Bruce in the s.s. *Scotia*. Dr Bruce established a meteorological station at Laurie Island in the South Orkneys in 1903, the working of which was entrusted to the Argentine meteorological office in the following year. He spent the Antarctic winter of 1903 at Laurie Island and in 1904, after revisiting Laurie Island to land the Argentine meteorologists, he penetrated deep into the Weddell Sea, discovering *Coats Land* (named after a Scottish supporter of the expedition) which is now the eastern frontier of the Falkland Islands Dependencies on the Antarctic continent.

15. In 1904 the Norwegian whaling expert, Captain Larsen, formed a company in Buenos Aires, the *Compañía Argentina de Pesca*, for the purpose of whaling in the Antarctic and established a shore whaling station at South Georgia. In 1905, a Chilean company, the South Georgia Exploration Company, financed by British subjects in Chile, was granted a mining and grazing lease of South Georgia by the Governor of the Falkland Islands and proceeded there, only to find Captain Larsen's *Compañía Argentina de Pesca* already in occupation of the best site for a base. Meanwhile, the Captain had applied through the British Legation in Buenos Aires to the British Government in London for a whaling licence for South Georgia. The British Government, learning that another licence had previously been granted by the Governor, despatched H.M.S. *Sappho* to South Georgia to investigate the situation on the spot. The result was that a whaling licence was granted by the Governor to the Argentine company, and the Chilean company then abandoned its project. In the same year, 1905, Norwegian whalers visited South Georgia and the South Shetlands, taking with them the first whale-factory ship employed in the Antarctic. In connection with this enterprise, the Norwegian Government addressed an inquiry to the British Government concerning the sovereignty of territories in the area between longitude 35° and 80° West and latitudes 45° and 65° South, i.e., in the area covering South Georgia, the South Shetlands, the South Orkneys and the northern part of Graham Land. The British Government replied that the South Shetlands were not international but were British possessions as were also South Georgia, the South Orkneys and Graham Land (the South Sandwich Islands lie outside the area of the Norwegian inquiry) and that Norwegian whalers should apply to the Governor of the Falkland Islands for any facilities that they might need.

⁴ As regards the nature of the connection between the Falkland Islands and the Dependencies, see footnote ² to paragraph 2 above.

16. In view of these developments, the Falkland Islands Government promulgated a whaling Ordinance in 1906 (Ordinance No. 3 of 1906) by which the taking of whales without licence was made unlawful, and a royalty was made payable in respect of each whale caught under licence from that Government. It was further considered desirable, in view of the increasing importance of the five principal territories as whaling and sealing bases, to make specific provision for their government and to make more specific provision for their government as dependencies of the Falkland Islands. Accordingly, on July 21, 1908, as recited in paragraph 2 above, South Georgia, the South Orkneys, the South Shetlands, the South Sandwich Islands and the territory of Graham Land were by Royal Letters Patent formally constituted Dependencies of the Colony of the Falkland Islands and placed under its government. Under these Letters Patent (Annex 1 hereto, No. 1) it was provided that:

- (a) the Governor of the Colony should be the Governor also of the Dependencies and be invested with the same powers of government and legislation in respect of them as he should from time to time possess in the Colony;
- (b) the Executive Council of the Colony should act also as the Executive Council of the Dependencies;
- (c) the Governor should have, and be deemed always to have had, power by and with the advice and consent of the Legislative Council of the Colony, to make laws for the peace, order and good government of the Dependencies;
- (d) the Governor should have, and be deemed always to have had, power to make grants and dispositions of land within the Dependencies in the name of the Crown.

The definition of the lands comprised in the Falkland Islands Dependencies, as mentioned in paragraph 2 above, was afterwards amended by Letters Patent of March 28, 1917, so as to include explicitly all islands and territories situated between longitudes 20° and 50° West, and south of latitude 50° South; and all islands and territories situated between longitudes 50° and 80° West, and south of latitude 58° South. The lines of longitude and latitude laid down in these Letters Patent as defining the territories comprised within the Falkland Islands Dependencies are indicated on the map exhibited as Annex 2 of this Application.⁵

*Display of British sovereignty in or in regard to the Dependencies
in the period July 21, 1908–September 22, 1938*

17. Great Britain's title to the islands and territories of the Dependencies was thus formally confirmed and defined by the issue of the Letters Patent of 1908 and 1917, but, as has been shown, it did not originate in or depend on these Letters Patent, and had been in existence for many decades previously. This title was now consolidated and maintained by a further effective display and exercise of British sovereignty. In pursuance of the authority contained in the Letters Patent of 1908, a Falkland Islands Ordinance was promulgated in that year under which the Governor in Council was empowered to declare any law passed for the Colony to be applicable also in the Dependencies so far as might be appropriate to their circumstances. Under this principal Ordinance numerous laws were either made or made applicable to the Dependencies by the Governor in Council, covering *inter alia* the administration of civil and criminal justice, marriage, testacy and intestacy, &c., and constituting a full and sufficient corpus of laws for those territories, having regard to their particular circumstances.

18. Especially important are the laws made by the Falkland Islands Government for whaling and sealing, which provide convincing proof of the effectiveness of Great

⁵ Reference is again made to footnote ² to paragraph 2.

Britain's display and exercise of sovereignty in the Dependencies. In 1908 the whaling Ordinance of 1906 referred to in paragraph 16 above was repealed, and replaced by a new Ordinance. This principal whaling Ordinance of 1908, as amended by later Ordinances, together with the Regulations made under it, established a detailed and comprehensive code of whaling law for the Dependencies, as can be seen from the summary of the whaling laws in force in the Dependencies in 1920 which is contained in the report of an official committee presented to the British Parliament in that year (Command Paper No. 657). The relevant extract from this report is annexed to this Application (Annex 1 hereto, No. 5). It shows that one of the chief objects of the legislation was the conservation of stocks by regulating the number and tonnage of whaling vessels, the number of whaling licences, the number of whales to be taken by each licence-holder, by protecting whale calves and by other measures. Analogous, if somewhat less elaborate, laws were introduced in 1909 for the regulation of sealing in the Dependencies. These laws made it unlawful to take seals in the Dependencies without a licence, gave authority for the issue of licences, and provided for the creation of a close season and of seal reserves.

19. The above-mentioned whaling and sealing laws were actively and extensively applied in the Dependencies. For whaling-licence purposes, as appears from the summary of laws given in Annex 1, No. 5, the Dependencies were divided into four units—South Georgia, the South Shetlands together with Graham Land, the South Orkneys and South Sandwich Islands.

(1) In the case of *South Georgia*, the Buenos Aires company mentioned in paragraph 15 above, the Compañía Argentina de Pesca, was granted a lease of 500 acres of land at an annual rent of £250 for 21 years from January 1, 1906, and obtained an additional lease of land in 1909. Seven other companies, four Norwegian and three British, were granted whaling leases between 1908 and 1911 on terms similar to those given to the Argentine company. Applications for further leases in South Georgia were refused in order to conserve whale stocks. The whaling companies concerned, in addition to their leases, were required to take out whaling licences for South Georgia which were renewable annually. In 1910 the Argentine company took out, in addition, a sealing licence, and after that year South Georgia was divided into four areas for sealing purposes, three being let out on licence each year and the fourth being left vacant as a seal reserve. An additional place was made into a seal reserve in 1918.

(2) In the case of the *South Shetlands* and *Graham Land*, a licence to take whales in their territorial waters was granted to a Chilean company in 1907, and a similar licence was granted in 1908 to a Newfoundland company. By the season of 1912–13, there were 12 factory ships and 32 catchers of various companies working in the South Shetlands area, all holding licences from the Falkland Islands Government. In 1912 a Norwegian company, the Hektor Whaling Company, was granted a 21 years' lease of a site on Deception Island for a whaling station but, in the absence of other suitable sites, the remaining companies operated with factory ships moored at Deception Island or, occasionally, at King George Island. From that date, whaling companies operated in the territorial waters of the South Shetlands and Graham Land under licence from the Falkland Islands Government every year without interruption, even during the first world war, until 1930, when developments in pelagic whaling led them to conduct their operations on the high seas. Activity in these two territories has been practically confined to whaling, although one sealing licence was issued in 1913 with respect to Graham Land.

(3) In the case of the *South Orkneys*, the first whaling licence was granted in 1908 to the Newfoundland Steam Whaling Company. Other companies applied for licences, and in the 1914–15 season four Norwegian companies were granted licences. Whaling ceased during the remainder of the first world war, but in 1920 a Norwegian

company, the A/S Tönsberg Hvalfangeri, was granted a lease of 500 acres on Signy Island for a shore whaling station. A further whaling lease for the South Orkneys was granted in 1925 but by 1930 pelagic whaling had made it unnecessary for whalers to conduct their operations in territorial waters, and applications for licences ceased. One sealing licence was also issued for the South Orkneys in 1913.

(4) In the case of the *South Sandwich Islands*, where access to the land is extremely difficult, whaling activity has been less frequent. In 1912, six Norwegian companies took out licences from the Falkland Islands Government, and in 1927 the Tönsberg Company applied for and obtained a licence. In addition, a sealing licence was granted in 1910 for the South Sandwich Islands to the Argentine company, the *Compañía Argentina de Pesca*.

20. British sovereignty has also been displayed and exercised in the Dependencies through magistrates commissioned by the Falkland Islands Government.

(i) As early as 1909, a resident Magistrate was sent to *South Georgia*, and there has been a British administration in that group continuously since that date. Customs and police officers were added to the magistrate's staff, and in 1912 a post office was established at Grytviken. By 1925, the government buildings included offices, a wireless station and a marine laboratory in addition to dwelling houses.

(ii) The *South Shetlands* and *Graham Land*, as mentioned in paragraph 18 above, have been treated as a single unit for the purpose of the whale fishery, a single licence being granted to cover both these territories. The whaling companies normally made their base first at Deception Island in the South Shetlands. If the season was favourable, they moved southwards through Bransfield Strait and established a forward base in the Palmer Archipelago either in the Melchior Islands or at Port Lockroy. But Port Foster at Deception Island is the most convenient starting point for operations in Bransfield Strait and off Graham Land, and it was accordingly made by law a "port of entry" for shipping visiting the area. A resident British Magistrate was sent to Port Foster every summer season from 1910 to 1930, and this official exercised jurisdiction over all whaling vessels operating in the waters either of the South Shetlands or of Graham Land and its coastal islands. From 1912 to 1930 a post office was maintained by the Magistrate at Port Foster.

(iii) At the *South Orkneys* whaling activity was somewhat less frequent than at South Georgia and the South Shetlands, with the result that the visits of British Magistrates were correspondingly less regular. But in 1913 a Customs Officer spent two months in the islands supervising the observance of the whaling laws, while a special Whaling Officer spent about three months there both in 1914 and 1915. Next, the South Georgia magistrate went to Signy Island in 1921 to inspect the site which the Tönsberg Hvalfangeri Company proposed to lease, and in the following year a Whaling Officer spent three months at Signy to ensure that the terms of the lease and the whaling laws were carried out by the company. In the three seasons 1925-26, 1926-27 and 1927-28, a Whaling Officer again spent three months in the South Orkneys. In 1928 the Governor of the Falkland Islands himself visited Signy Island to inspect the area leased to the Tönsberg Hvalfangeri Company.

(iv) The comparatively slight whaling activity at the almost inaccessible *South Sandwich Islands* has called for very little exercise of administrative authority at the islands themselves.⁶

21. The cessation of certain facilities and activities after 1930 came about as follows. The introduction between 1925 and 1930 of pelagic whaling with large whale factory ships enabled the whaling companies to conduct their operations on the high seas without the use of bases ashore or in coastal waters. The result was

⁶ Coats Land (see paragraphs 14 and 15 above) is also not discussed here in any further detail, only very recent Argentine action having brought this territory into question (see paragraph 4 above).

that after 1930 the companies, in order to avoid payment of the licence fees imposed by the Falkland Islands Government, ceased to take out licences for operating from bases in the various Dependencies—(licences continued to be taken out by the companies with permanent bases in South Georgia). But, although in consequence there was some diminution in the administrative activity of the Falkland Islands Government with regard to the whaling vessels themselves, British State activity in the Dependencies continued in full force and without interruption in the period between 1930 and the outbreak of the second world war. During this period, the Dependencies were extensively visited and surveyed by the vessels of the *Discovery Committee*, an official body responsible to the Secretary of State for the Colonies. As early as 1917, proposals had been made for a thorough investigation into the economic resources of the Dependencies, and a Committee had been set up to report on the preservation of the whaling industry, the possibilities of developing other industries, and the needs of scientific research. Following the presentation of this Committee's report to the United Kingdom Parliament in 1920, a permanent Committee known as the *Discovery Committee* was established in 1923 under the direction of the Secretary of State for the Colonies. The principal function of this Committee, under its terms of reference, was to conduct research into the economic resources of the Antarctic and sub-Antarctic regions, with special reference to the Falkland Islands Dependencies. But its functions also included coastal surveys and general scientific research into the oceanography, weather and ice conditions and flora and fauna of the Antarctic and sub-Antarctic regions. Between 1925 and 1939 the Committee's research ships, *Discovery* (one commission), *Discovery II* (five commissions) and *William Scoresby* (seven commissions) made very extensive investigations of the Dependencies. Numerous voyages among the principal territories of the Dependencies were made by these ships on each commission, and detailed surveys were made of their coasts and coastal waters. As a result, the Dependencies during this period were covered literally by a network of patrols undertaken by the *Discovery Committee*. The main focus of the Committee's research was on the natural history of whales, the most important economic resource of the Dependencies, and especially intensive observations were made on the whaling grounds of South Georgia, the South Shetlands and Graham Land. But the Committee also collected very extensive information on the hydrography and biology of the Dependencies, on the navigation and charting of their waters, and on Antarctic ice and ice navigation. A large and important body of scientific material has been published by the Committee in the 27 volumes of *Discovery Reports*, and its research on the natural history of whales is admitted by expert opinion to have made a vital contribution towards the effective solving of the international problem of the conservation of whale fisheries.

22. In addition, a large-scale expedition, the *British Graham Land Expedition*, visited the southern parts of the Falkland Islands Dependencies in 1934–37 to make land investigations. Reaching Deception Island late in 1934, the expedition proceeded to Port Lockroy in the Palmer Archipelago in January 1935. Shortly afterwards, a base was established and occupied further south, and from there various sledge and plane journeys were made which threw much fresh light on the geography of the area. In February, 1936, the expedition moved still further to the south to Marguerite Bay and established a base on the Debenham Islands. From there, important sledge journeys were made across Graham Land to the east coast and far southwards into King George VI Sound. Numerous reconnaissance flights were carried out, and the expedition ascertained conclusively for the first time that Graham Land is attached to the Antarctic mainland.

23. Other examples of the display of British sovereignty in or in regard to the Dependencies during the period July 21, 1908–September 22, 1938, are mentioned in the three next succeeding paragraphs of this Application dealing with the recognition

of the British claims by Norway, Argentina and Chile. Still further examples could be cited. The facts given in paragraphs 16–22 above and in paragraph 24 below, however, are by themselves sufficient to establish conclusively a continuous and peaceful display of British sovereignty in and in regard to the territories of the Dependencies during the period July 21, 1908–September 22, 1938, which is that reviewed in the present section.

Recognition of the British claims by Norway, Argentina and Chile after the issue of the Letters Patent of July 21, 1908

24.—(1) The existence of British claims, not only to South Georgia but to other territories in Antarctic and sub-Antarctic regions was known in *Norway* before the formal constitution of the five principal territories as Dependencies of the Falkland Islands by the Letters Patent of 1908. The Norwegian Government, as stated in paragraph 15 above, addressed an enquiry to Great Britain in 1905 concerning the sovereignty of the territories situated between 35° and 80° West, and was informed in reply that South Georgia, the South Orkneys, the South Shetlands and Graham Land were British possessions. When Norway made a further enquiry in 1907, Great Britain reasserted her claim. Norway, neither then nor after the issue of the Letters Patent of 1908, made any protest or reservation against the assertion and exercise of British sovereignty over the Dependencies. At the same time numerous Norwegian whaling companies took out British licences and otherwise complied with the laws of the Falkland Islands Government. These facts establish by implication Norway's recognition of British sovereignty over the Dependencies in or about 1908. This implication is completely confirmed by the Norwegian Proclamation of January 14, 1939, in which the western boundary of Norway's own Antarctic claim was defined by a line coinciding with the eastern boundary of the Falkland Islands Dependencies. It was further expressly stated in the Proclamation that the area named the Falkland Islands Dependencies had been brought under Great Britain's dominion in 1908.

(2) The existence of British claims to at least some of the Dependencies was also well known in *Argentina* before the issue of the Letters Patent of 1908. It has been mentioned above (paragraph 15) that as early as 1906 an Argentine company, the *Compañía Argentina de Pesca*, took out a British lease of land in South Georgia for 21 years. *Indeed, it was the then Director of Armaments of the Argentine Ministry of Marine who, in his capacity as technical adviser to the company, visited the British Legation in Buenos Aires to apply for the lease.* In the same year Great Britain, in order to remove any possible misconception as to the legal basis on which operation of the meteorological station on Laurie Island in the South Orkneys had been transferred to the Argentine Meteorological Office (see paragraph 14 above), addressed a note to the Argentine Government emphasising that the islands were a British possession. This reservation of the British sovereignty over the South Orkneys was repeated to Argentina in January 1907. Shortly afterwards, when Chile proposed to Argentina the negotiation of a treaty dividing between the two countries "the islands and the American Antarctic continents," the Argentine Foreign Minister, in rejecting the proposal, said expressly that "Chile ought to know that England claimed all these lands." In 1908, after the issue of the Letters Patent formally constituting the Falkland Islands Dependencies, the Argentine Foreign Minister asked to be informed of the terms of the British "declaration." Accordingly, the British Minister in Buenos Aires in a note of February 20, 1909, transmitted to the Argentine Foreign Minister a copy of the *Falkland Islands Gazette* containing the text of the Letters Patent. The Argentine Foreign Minister replied in a note of March 18, 1909:—

"I have the pleasure of acknowledging the receipt of your Note dated the 20th of February last with which you were good enough to forward a publication called

Falkland Islands Gazette containing a Decree by which the 'South Orkneys' are declared a dependency of the 'Falkland Islands.'

"While thanking you for this attention, I am happy to renew to you the assurances of my high consideration."

The British Minister, in communicating this reply to the British Foreign Office, commented that he concluded from its terms that "Argentine Government do not dispute the rights of Great Britain over the South Orkneys." *A fortiori* it is to be concluded from the terms of her reply that in 1909 Argentina did not dispute the British title to South Georgia, the South Sandwich Islands, the South Shetlands and Graham Land, which territories were also covered by the communication sent to the Argentine Government, but were not mentioned in the Argentine reply.⁷ Three years later, negotiations were begun for the cession by Great Britain to Argentina of the South Orkneys in return for a Legation site in Buenos Aires and on condition of respecting any existing British whaling rights. By 1914, the final text of a treaty of cession had been agreed between the two countries but, on a change of Government in Argentina, the new Government declined on financial grounds to complete the transaction. The terms of this draft treaty provide further evidence of Argentina's recognition of the British title of the South Orkneys at this time, *notwithstanding the presence of the Argentine meteorological station on Laurie Island*. Again, Argentina made no protests or reservations against the issue of the British Letters Patent of 1917. Nor did she make any protests or reservations against the promulgation of British laws for the Dependencies, nor against the application of those laws to the Argentine company, the Compañía Argentina de Pesca, and to other foreign companies. Nor did she make any protests or reservations against the exercise of authority by British magistrates in the several territories of the Falkland Islands Dependencies and, in particular, in the South Orkneys, South Shetlands and Graham Land. These facts establish beyond question that at this period Argentina recognised British sovereignty over the Dependencies.

(3) The existence of British claims at least to some of the Dependencies was equally known in *Chile*, even before the issue of the Letters Patent of 1908. Three years earlier, in 1905, a Chilean company, as stated in paragraph 15 above, applied for a British lease of land in South Georgia from the Falkland Islands Government. In 1907, another Chilean company, the Sociedad Ballenera de Magallanes of Punta Arenas, took out a British whaling licence for the South Shetlands and Graham Land. In the same year, when Chile invited Argentina to negotiate a division of "the islands and American Antarctic continents," she was expressly warned by Argentina that "England claimed all these lands." Neither then nor after the issue of the Letters Patent of 1908 or of 1917 did Chile make any protest or reservation against the assertion and exercise of British sovereignty over the Dependencies. She maintained a Consular Officer in the Falkland Islands, but at no time did she make any representations either to the Government of Great Britain or to the Falkland Islands Government in regard to the Letters Patent, or to the promulgation of British laws for the Dependencies, or to the application of those laws to the Chilean company, the Sociedad Ballenera de Magallanes, and to other foreign companies. Nor did she make any protests or reservations against the exercise of authority by British magistrates in the several territories of the Falkland Islands Dependencies and, in particular, in the South Shetlands and Graham Land. All these facts establish beyond question that at this period Chile recognised British sovereignty over the Dependencies.

25. The facts recited in the three immediately preceding sub-paragraphs show

⁷ It seems clear in fact that Argentine interest at that date hardly extended beyond the South Orkneys, where the Argentine meteorological station was situated.

conclusively that, during the years at the beginning of the present century, when Great Britain was confirming and consolidating her ancient titles to the Dependencies, Norway, the State principally interested in Antarctic whaling, and Argentina and Chile, made no reservations in regard to Great Britain's display and exercise of State activity in those territories. They further show that these three States in fact recognised Great Britain's sovereignty over the Dependencies. Nor did any other State during this period make any reservations or enter any protests against the British claims.

*Origin and development of Argentina's pretensions to the islands
and lands of the Falkland Islands Dependencies and attempted usurpation
of British sovereignty over these territories*

26. Argentina, as related in paragraph 24 (2) above, was left in no doubt by Great Britain that the transfer to the Argentine Meteorological Office in 1903 of the meteorological station previously established on Laurie Island in the South Orkneys by a British expedition did not also involve the transfer to Argentina of the sovereignty either of the South Orkneys group or of Laurie Island itself. Argentina, as was also related in paragraph 24 (2), was fully aware in 1908 of the British claims to the several territories of the Falkland Islands Dependencies, and during the first part of the present century showed by her acts that she recognised Great Britain's sovereignty.

27. Notwithstanding this, the Argentine Government in 1925 embarked upon a course of action by which it has progressively, and it would seem deliberately, sought to encroach upon the Falkland Islands Dependencies, with a view to ousting the British Crown from its sovereignty, and to replacing it by a pretended Argentine sovereignty. In that year, on the erection by Argentina of a wireless station at the observatory on Laurie Island, a Note was addressed to the Argentine Government drawing its attention to the fact that under the relevant International Telegraph Conventions, the call sign would have to be applied for through the British Government. The Argentine Government replied that, with regard to wireless stations constructed on Argentine territory, it would act in accordance with the Conventions. In view of the equivocal nature of this reply, a further Note was addressed to the Argentine Government on April 14, 1926, emphasising Great Britain's undoubted rights to the sovereignty of the islands and pointing out the absence of any previous notice of claim on the part of Argentina. No answer was returned by Argentina and, on the wireless station being put into operation in 1927 without reference to the British Government, the latter learned from the International Telegraph Bureau at Berne that the call signal had been applied for by Argentina in terms implying an assumption of Argentine sovereignty over the South Orkneys. Great Britain having objected to this action in a Note of September 8, 1927, Argentina replied in a Note of January 20, 1928, that she herself laid claim to the South Orkneys on the ground, apart from pretended "inalienable rights," of an alleged first occupation constantly maintained. (This may be contrasted with the Argentine attitude about the South Orkneys in 1909, described in paragraph 24 (2) above—and as regards the pretended Argentine "first occupation," see paragraph 14 above.) At the same time, however, the Argentine Government in an accompanying memorandum showed itself conscious of the weakness of its position by suggesting the reopening of the negotiations for the exchange of the islands against the grant of a Legation site in Buenos Aires (see paragraph 24 (2) above). Meanwhile, the Argentine Government in 1927 had also represented to the International Postal Bureau at Berne that Argentine territorial jurisdiction extended *de jure* and *de facto* over both the South Orkneys and South Georgia. On this statement being contested by Great Britain in an aide-mémoire of December 17, 1927, the Argentine Government replied that, as regards the South

Orkneys, it formally reaffirmed its previous claim. Accordingly, Great Britain took steps in 1928 to notify the International Postal Bureau that both the South Orkneys and South Georgia were included in the Falkland Islands Dependencies and were represented in Postal Union matters by the British Postmaster-General.

28. On June 1, 1937, the Argentine Ambassador in London drew the attention of the Foreign Office to a statement by the British Minister of Agriculture and Fisheries at the inaugural session of the Whaling Conference, to the effect that the Dependencies were under the jurisdiction of the Falkland Islands Government, and he reserved the rights claimed by Argentina over them. The Ambassador's *démarche* was the first intimation of an Argentine claim not merely to South Georgia and the South Orkneys *but to all the territories of the Falkland Islands Dependencies*. The progressive and deliberate character of the Argentine invasion of British rights is thus evident. The British Foreign Secretary, while joining in an agreed statement that the character and purpose of the Whaling Conference had nothing to do with questions of jurisdiction, made an express declaration that the Argentine reservation could not in any way affect British rights to the Falkland Islands Dependencies. That Argentina had now enlarged her pretensions to include all the Dependencies was, however, confirmed by an express reservation to that effect on September 22, 1938, made by the Argentine President when promulgating Argentina's ratification of the various postal conventions concluded at Cairo on March 20, 1934, which the United Kingdom had signed on behalf of the Falkland Islands and their Dependencies.

Rejection of the Argentine pretensions by the United Kingdom and continued display of British sovereignty up to the present time

29. The methods (of which some account has just been given) by which Argentina sought between 1925 and 1938 to advance pretensions to the sovereignty of the Falkland Islands Dependencies were not those to be expected of a State already having sovereignty, and relying upon prior and well-established legal titles. They were rather those of a State seeking gradually to manoeuvre another State out of its possession and rights. Instead of actively displaying and exercising its authority in and in regard to the territories of the Dependencies in accordance with their circumstances, the Argentine Government merely attempted by diplomatic moves to throw doubt upon the existing British titles. Thus, in the first quarter of the present century, when the territorial waters of the Dependencies were the base of operations of several whaling companies of different nationalities, Argentina took no measures (as a prudent sovereign would have done, or sought to do) to regulate these activities, or to conserve the stocks of the principal economic resource of the territories concerned. Nor in 1927, although she was a Member of the League of Nations and had recently formulated pretensions to the South Orkneys and South Georgia, did Argentina take any part in the Whaling Conference convened at Geneva in that year under the auspices of the League, which, if she had had sovereignty over these territories, she might be expected to have done. Nor did she voice any objection to the fact that the United Kingdom took a leading part in that conference in its capacity as the State responsible for the regulation of whaling in the Falkland Islands Dependencies. It was only in 1937 that Argentina first participated in an international whaling conference and contested the United Kingdom's right to represent the whaling interests of the Dependencies. During the whole period up to 1938 Argentine interests in the Dependencies consisted in actual practice of a meteorological station in the South Orkneys, taken over (but not on a basis of sovereignty) by the permission and at the invitation of the British Government (see paragraphs 14 and 24 (2) above), and an Argentine whaling company operating in

South Georgia continuously under leases and licences issued by the British Crown as sovereign of the Dependencies (see paragraphs 15 and 19 (1) above). On the other hand, Great Britain during this period, as related in paragraphs 13–25 above, displayed and exercised her authority in and in regard to the Dependencies according to their circumstances. During all this period, up to 1938, Great Britain alone undertook the responsibilities of sovereignty and performed the functions of a State in and in regard to the several territories of the Dependencies. It is not, therefore, to be wondered at that, as indicated above, the British Government rejected all Argentina's pretensions to the territories of the Dependencies and continued to assert its own titles to them.

30. After the outbreak of the second world war, in 1939, the United Kingdom Government was occupied in the North and South Atlantic in dealing with attacks by Axis naval forces on allied and neutral sea-borne trade; and in March, 1941, dispatched H.M.S. *Queen of Bermuda* to the South Shetlands to destroy oil tanks and stocks of oil left on Deception Island by the Hektor Whaling Company, one of the companies holding a lease of land on that island from the British Crown. This measure, which was taken to deny the use of the oil tanks and fuel stocks to Axis raiders, constituted a most significant display and exercise of British sovereignty over the South Shetlands. In January, 1943, another British warship, H.M.S. *Carnarvon Castle*, was dispatched to the South Orkneys and South Shetlands, to examine the anchorages in these territories for any signs of use by enemy raiders, and to investigate press reports of purported acts of sovereignty at Deception Island by the Argentine naval transport *Primero de Mayo*. H.M.S. *Carnarvon Castle* landed a party at Deception Island in the South Shetlands on January 8, and there obliterated from the walls of the Hektor Whaling Company's factory the national colours of Argentina, which appeared to have been painted on them recently by the *Primero de Mayo*, and also removed the Argentine notice of claim mentioned in paragraph 3 above. A writ was at the same time affixed to the building proclaiming that the company's lease had lapsed and that the building was the property of the British Government. The warship then proceeded to the South Orkneys, and on February 8 landed a party on Signy Island, which erected flagstaffs carrying the Union Jack. The following day the vessel called at the meteorological station on Laurie Island and exchanged courtesies with the Argentine staff. Meanwhile the Argentine Government was notified of the visit of H.M.S. *Carnarvon Castle* to Deception Island, and was informed that the United Kingdom Government had no intention of allowing the British title to the island to be usurped by Argentina. Soon afterwards the *Primero de Mayo* was reported to be departing again for the Falkland Islands Dependencies, and to have two Chilean naval officers on board. The Republic of Chile having also formulated pretensions to the South Shetlands and Graham Land, the British Ambassador in Santiago made representations to the Chilean Government in regard to these officers. He was informed that they were sailing in the Argentine ship merely as observers, and that the Chilean Government had itself protested against Argentine attempts to establish a claim to Deception Island.⁸

31. The United Kingdom Government, in view of the apparent intention of Argentina and Chile to disregard British territorial rights in the South Orkneys, South Shetlands and Graham Land, dispatched H.M.S. *William Scoresby* and S.S. *Fitzroy* to those territories at the end of January, 1944. These ships visited the mainland and coastal islands of Graham Land, Deception Island in the South Shetlands, and Signy Island in the South Orkneys. A permanent shore base was

⁸ It will be observed that both these States had now started to lay claim to the same British territories (see separate Application respecting Chile)—a circumstance that can hardly fail to reflect adversely both on the motives and the validity of both sets of claims.

established at Deception Island and another at Port Lockroy in the Palmer Archipelago off the west coast of Graham Land, meteorological stations being attached to both bases. Further visits were paid by H.M.S. *William Scoresby* to these two bases in March and, again, in April, 1944. Magistrates were sworn in for the South Orkneys, South Shetlands and Graham Land, and a special series of postage stamps was issued for the use of British establishments in those territories and in South Georgia. Since 1944 the United Kingdom has maintained a number of British bases in the Dependencies, the following being the bases (either constructed or re-established) in the territories on which Argentina has made encroachments—

South Orkneys—

Sandefjord Bay, Coronation Island (1945)
Cape Geddes, Laurie Island (1946)
Signy Island (1947)

South Shetlands—

Port Foster, Deception Island (1944)⁹
Admiralty Bay, King George Island (1947)

Graham Land and its archipelagos—

Port Lockroy, Palmer Archipelago (1944)
Hope Bay, Trinity Peninsula (1945)
Stonington Island, Marguerite Bay (1946)
Barry Island, Debenham Islands (1946)¹⁰
Argentine Islands (1947)¹⁰
Duse Bay, Trinity Peninsula (1953)

The United Kingdom Government has sent ships to the South Shetlands–Graham Land area every Antarctic summer since 1944; and all the above bases, with the exception of those in Laurie Island and in the Debenham Islands, have been occupied either continuously or intermittently by British parties. A special organisation, the *Falkland Islands Dependencies Survey*, was set up in 1945 to administer these bases, together with three others in the South Orkneys, and to supervise their work. Under its direction extensive surveys and explorations were carried out in the Dependencies, including ground surveys, over large stretches of the Graham Land peninsula, and meteorological stations were established. Sovereignty was also displayed in other ways as, for example, by the appointment of magistrates, the issue of postage stamps, and the lodging of protests both locally and through the diplomatic channel against encroachments by Chilean and Argentine parties. Thus, the United Kingdom Government has at all times taken all such steps as were open to it in the circumstances to assert and maintain its title.

*Argentina's persistence in her pretensions to the Falkland Islands Dependencies
and in her physical encroachments on the South Orkneys,
South Shetlands and Graham Land*¹¹

32. In 1941 Argentina, which in the period 1925–38 had put forward mainly paper claims, embarked upon a definite policy of encroachment in the South Orkneys, South Shetlands and Graham Land. In that year the meteorological station on

⁹ Headquarters of British Magistrates, 1910–20.

¹⁰ Built and occupied by the British Graham Land Expedition, 1936–7.

¹¹ As has already been mentioned (paragraphs 3 and 26–28 above), Argentina has made a paper claim to all the territories comprised in the Falkland Islands Dependencies. She has not, however, attempted to assert this claim in any overt way with reference to the South Sandwich Islands or South Georgia. These territories are not therefore further mentioned herein, except in the Conclusions.

Laurie Island in the South Orkneys was manned by Argentine *naval* personnel, and the opening of a permanent post office in the South Orkneys was announced in Argentina and notified through the International Postal Union. The following year the naval transport *Primero de Mayo* was sent to Deception Island in the South Shetlands where, as has already been stated, it painted the Argentine colours on the walls of the Hektor Whaling Company's factory and deposited the notice claiming all lands and dependencies between 25° and 68° 34' West, which is mentioned in paragraph 3 above. The ship then proceeded to Lambda Island (Melchior group) in the Palmer Archipelago and erected a flag and beacon there. A year later, the Argentine colours on Deception Island were obliterated by H.M.S. *Carnarvon Castle*, and the Argentine act of possession was removed (paragraph 30 above). On being so informed, the Argentine Foreign Minister replied that the Argentine Government considered its claims, "inherited from Spain,"¹² to be justified. In a memorandum of February 15, 1943, the Argentine Government reaffirmed its pretensions to all Antarctic lands and dependencies south of latitude 60° South and between longitudes 25° and 68° 34' West. It also purported to "protest" against jurisdictional acts carried out by British officials. The United Kingdom Government, in a memorandum of April 7, 1943, replied reasserting the British titles. Meanwhile, the *Primero de Mayo* was engaged on a second expedition to the Antarctic, during which it visited the Melchior Islands and Port Lockroy in the Palmer Archipelago, and Marguerite Bay further to the south. The ship then returned to Deception Island in the South Shetlands, and there repainted the Argentine colours on the walls of the whale factory. It was after this expedition that the United Kingdom, despite its heavy commitments in the second world war, initiated in 1944 the programme of maintaining British bases in the South Orkneys, South Shetlands and Graham Land described in paragraph 31 above.

33. In 1947, some three years after the renewal of the British programme of bases, the Argentine Government began a course of systematic encroachment on the British territories of the South Shetlands and Graham Land. While continuing its meteorological station at Laurie Island in the South Orkneys, it proceeded to establish, as well as a few emergency huts, the following Argentine posts:¹³

South Shetlands—

- Port Foster, Deception Island (1947)
- Half Moon Island, Livingston Island (1952)
- Potter Cove, King George Island (1953)
- Harmony Cove, Nelson Island (1954)
- Ardley Peninsula, King George Island (1954)

Graham Land and its archipelagos—

- Gamma Island, Palmer Archipelago (1947)
- Paradise Harbour, Danco Coast (1951)
- Barry Island, Debenham Islands (1951)
- Hope Bay, Trinity Peninsula (1951)
- Dundee Island (1952)
- Brialmont Cove (1954)
- Petermann Island (1955)

Coats Land—

- In the neighbourhood of Vahsel Bay (1955)

¹² The territories concerned were barely discovered in Spain's day, and then not by Spain (see paragraphs 6–11 above). They were never part of any Spanish dominion.

¹³ The United Kingdom Government are still engaged in investigating the most recent Argentine encroachment at Vahsel Bay in Coats Land (see paragraphs 4, 14 and 15 above) where an Argentine post may have been established.

These posts are all within the Falkland Islands Dependencies and in areas covered by British activity as already described. The recent or very recent establishment of these Argentine posts appears to foreshadow a rapid expansion of the present Argentine encroachments and violations of British sovereignty. Protests against these violations and encroachments have been lodged at various dates by the United Kingdom through the diplomatic channel, and locally by officials of the British Administration in the Falkland Islands Dependencies. The Argentine Government has nevertheless persisted in its policy of encroachment, maintaining the above-mentioned posts, and repeatedly manifesting its intention to continue to disregard the United Kingdom's prior and well established legal titles.

34. In the opinion of the United Kingdom Government, these Argentine acts taken together, and related to the complete absence of any Argentine claim prior to 1925 or 1937, as the case may be (depending on the territory concerned), and to the previous complete Argentine indifference to, and even recognition of, the British claim, are evidence of a quite recent, deliberate, and considered policy of infiltration on the part of the Argentine Government, directed to creating a semblance or fiction of Argentine sovereignty, and to placing that Government in a position, after a sufficient lapse of time, to argue that any previous British sovereignty was now replaced or overlaid by Argentine sovereignty. In effect, this is a policy of usurpation.

Limited relevance in point of law of events after 1925 in the case of the South Orkneys and after 1937 in the case of the South Shetlands and Graham Land

35. The acts of the Parties after 1925 in the case of the South Orkneys; and after 1937, in the case of the South Shetlands and Graham Land, are of limited juridical relevance, for two reasons. First, the dispute crystallised when Argentina first asserted her claims, namely in or about 1926 in the case of the South Orkneys, and in or about 1937 in the case of the other two territories; and according to well-established principles of law, it is at the date of crystallisation that the rights of the Parties are to be adjudged. The subsequent acts of the Argentine Government were clearly undertaken, not as a genuine manifestation of an existing title, but with a view to trying to create one, and in order to improve Argentina's legal position. They are not, therefore, to be taken into consideration (*Minquiers and Ecrehos Case*, I.C.J. Reports, 1953, page 59). Secondly, even if the United Kingdom had not previously acquired a good title, it undoubtedly displayed and exercised its sovereignty in and in regard to the South Orkneys, South Shetlands and Graham Land during (at the latest) a period running—in the case of the first-named territory—from July 21, 1908, to 1925 and after; and—in the case of the other two territories—from July 21, 1908, to 1937 and after. Therefore, quite independently of its earlier titles, the United Kingdom had already in these periods established as against Argentina, an unimpeachable title to the sovereignty of these three territories. Accordingly, Argentina's assertions of title to the South Orkneys in 1925 and thereafter, and to the South Shetlands and Graham Land in 1937 and thereafter, were, and always have been, illegal and invalid (*Eastern Greenland Case* (1953), Series A/B 55, page 64). Events subsequent to 1925 or 1937, as the case may be, are thus primarily relevant for the purpose of showing that, in face of the Argentine pretensions, the United Kingdom did not abandon, but actively maintained, its titles to the territories in question. This is conclusively demonstrated in paragraphs 26–31 above. The United Kingdom, by its continued display of State activity; by protests or counter-measures, which were always prompt, and evidence of the exercise of due vigilance; by attempts to settle the dispute through diplomatic negotiations; by actively seeking to bring

the dispute to arbitration or judicial settlement (see paragraph 40 below); and by submitting the present Application to the Court, has energetically prosecuted its case, upheld its sovereignty, and maintained its rights and titles.

The jurisprudence of international tribunals negatives the Argentine claims and supports the United Kingdom's titles

36. The jurisprudence of international tribunals both negatives the Argentine claims and supports the legal titles of the United Kingdom, more especially the awards and judgments in the following well-known cases:—

The Island of Palmas (1928), 2 Reports of International Arbitral Awards, 831;
Clipperton Island (1931), 2 Reports of International Arbitral Awards, 1105;
Legal Status of Eastern Greenland (1933), Series A/B 55;
Minquiers and Ecrehos I.C.J. Reports, 1953, p. 47.

37. These modern cases of high authority negative completely any Argentine claim based on alleged historic grounds of title deriving from succession to supposed titles acquired by Spain. Apart from the fact that, on the evidence, no original Spanish titles can be established at all (see footnote¹² to paragraph 32 above), the *Island of Palmas Case* (page 846) and the *Clipperton Island Case* (page 1109) clearly show that any such early Spanish titles could not prevail to-day against long-continued British display and exercise of sovereignty. Again, even if it were possible to apply the doctrine of geographical contiguity to islands distant some 400 miles, or to a separate continent distant some 500 miles, from Argentine territory, the *Island of Palmas Case* (pages 854–855, 869 and 870) negatives completely any Argentine claim based on so-called geographical grounds of title, and clearly lays down that they could not prevail against actual display and exercise of sovereignty. It has also been suggested on behalf of Argentina that she never recognised British sovereignty over the Dependencies. Ignoring for present purposes the question whether recognition by other States is necessary for the acquisition of title, and if so in what circumstances, it suffices here to recall the facts related in paragraph 24 (2) above, which establish Argentina's acquiescence in and recognition of the British claims to those territories. But in any event the *Eastern Greenland Case* (page 62) and the *Minquiers and Ecrehos Case* (page 66) clearly show that any failure by Argentina to recognise the British claims would not have altered the character and legal effects of the British Letters Patent, or of the other British legislative and administrative acts, as manifestations of British sovereignty.

38. At the same time, the above-mentioned leading cases show conclusively that all recognised juridical grounds strongly support the claims of the United Kingdom, and not those of Argentina. Thus, the *Island of Palmas Case* (page 870) and the *Clipperton Island Case* (page 1110) indicate that the British takings of possession described in paragraphs 6–11 of the present Application created initial British titles superior to any of Argentina's pretended historical or geographical titles. The *Island of Palmas Case* (pages 838–840 and 867), *Eastern Greenland Case* (pages 52, 54 and 63) and *Minquiers and Ecrehos Case* (at page 65) conclusively show that to-day, in case of dispute, the primary test of sovereignty is the actual display and exercise of the functions of a State in and in regard to the disputed territories during the relevant periods. In the present case, it is evident from the facts set out in the present Application that it is the United Kingdom, not Argentina, that has displayed and exercised the function of a State in regard to the South Orkneys, South Shetlands and Graham Land, and especially during the decisive periods immediately preceding the critical dates, that is the period up to 1925 in the case of the South Orkneys, and up to 1937 in the case of the other two territories, as well as earlier.

39. The United Kingdom, in its pleadings, will refer with greater particularity to the numerous passages in the four above-mentioned leading cases and in other authorities which support its titles to sovereignty over the Falkland Islands Dependencies. Although the present Application is necessarily preliminary in character, the special circumstances appear to justify drawing attention to the jurisprudence of the four leading cases, as an indication of how solid are the legal bases of the British titles and how devoid of any foundation the Argentine pretensions.

Acceptance of the Court's jurisdiction in the case

40. The United Kingdom, having regard to the long period during which British sovereignty has been effectively exercised in and in regard to the territories of the Falkland Islands, would be justified in taking strong measures to put an end to Argentina's encroachments on the South Orkneys, South Shetlands and Graham Land.¹⁴ Firmly believing in the pacific settlement of disputes among nations by judicial procedures and on the basis of law, it has preferred, when negotiations proved fruitless, to seek to have its dispute with the Republic of Argentina regarding these territories submitted to the International Court or other judicial or arbitral tribunal. Thus, in Notes of December 17, 1947, the United Kingdom Government invited Argentina, and Chile to whom a separate invitation was sent, to challenge the British titles to sovereignty by invoking the jurisdiction of the International Court of Justice, which the United Kingdom would then accept. Argentina, in a Note of January 28, 1948, replied to the effect that she was convinced of the unquestionable rights of herself and Chile over the disputed areas,¹⁵ and that it would be wrong for her to appear before the Court in the position of a State requesting what already belonged to her. The United Kingdom renewed its offer to go before the Court in Notes of April 30, 1951, and February 16, 1953, without, however, obtaining a favourable response from the Republic of Argentina. As the continuance of the dispute concerning the sovereignty of the territories of the Falkland Islands Dependencies necessarily threatens to impair the existing friendly relations between the two countries, the United Kingdom addressed a further Note to Argentina on December 21, 1954, inviting her, jointly with the United Kingdom, to refer the dispute to an independent *ad hoc* arbitral tribunal. On the same date, the United Kingdom addressed an identical Note to Chile. Neither of these countries,¹⁶ however, has thought fit to accept the United Kingdom's proposal, and the Argentine Government has in the meantime sent an expedition to Vahsel Bay in Coats Land—a factor so recent that the United Kingdom Government has not yet had time to investigate it.

41. The United Kingdom, in its Notes of December 21 last, stated that, in the event of Argentina (or equally Chile) failing to accept its offer of arbitration, it reserved the right to take such steps as might be open to it to obtain an adjudication of its legal rights. One of the steps open to the United Kingdom is to bring the dispute before the Court by a unilateral Application under Article 40 (1) of the

¹⁴ Forcible action had in fact to be taken in one case (namely at Deception Island in February 1953), when a particularly flagrant attempt was made to erect an Argentine hut actually within the precincts of the existing (and occupied) British base on that island.

¹⁵ This can only increase the dubious character of the Argentine pretensions, since the Argentine and Chilean claims conflict over the most important part of the ground. Both could not be valid even if either were.

¹⁶ While the present Application is of course, formally, quite separate from the concurrent Application in respect of Chile, the fact that there are also Chilean pretensions relating to the South Shetlands—Graham Land area, and of equally or even more recent date, has a significance that cannot be overlooked. It is a clear case of two rival and incompatible attempts to oust and usurp the legitimate sovereignty of the United Kingdom.

Statute and Article 32 (2) of the Rules, and, as indicated in paragraph 1 above, it is this procedure which the United Kingdom has elected to adopt.

42. The United Kingdom Government, therefore, declares that it hereby submits to the jurisdiction of the Court for the purposes of the case referred to the Court in the present Application—(for the precise scope of this submission, see footnote 1 to paragraph 1 above). The Argentine Government has not, so far as the United Kingdom Government is aware, yet filed any declaration accepting the Court's jurisdiction, either generally under Article 36 (2) of the Statute or specially in the present case. The Argentine Government, which has frequently expressed its adherence to the principle of judicial settlement of international disputes, is, however, legally qualified to submit to the jurisdiction of the Court in this case. Consequently, upon notification of the present Application to the Republic of Argentina by the Registrar in accordance with the Rules of Court, the Argentine Government, under the settled jurisprudence of the Court, can take the necessary steps to that end, and thereby cause the Court's jurisdiction in the case to be constituted in respect of both Parties.

43. The United Kingdom Government founds the jurisdiction of the Court on the foregoing considerations and on Article 36 (1) of the Court's Statute; and asks that a copy of the present Application be transmitted to the Government of Argentina in accordance with Article 33 of the Rules of the Court, and to all members of the United Nations and other States entitled to appear before the Court, under Article 34 of the said Rules.

44. The attitude of the Argentine Government in this case has compelled the United Kingdom to take the initiative in placing the matter before the Court, and therefore in effect to appear as applicant. The United Kingdom Government nevertheless wishes to make the fullest reservations on the question of the onus of proof of title. It considers that the manifest priority in time of the British possession of the territories, dating back to periods varying between 110 and 180 years ago, and the complete absence during virtually the whole of those periods, until a quite recent date, of any activities of a sovereign character, other than British, in the territories, is indicative of a self-evident British title, which it is for any country challenging that title to rebut.

The contentions and claims of the United Kingdom Government in the case

45. The Government of the United Kingdom, in submitting this application to the Court, accordingly contends:—

- (1) that by reason of historic British discoveries of certain territories in the Antarctic and sub-Antarctic; by reason of the long-continued and peaceful display of British sovereignty from the date of those discoveries onwards in, and in regard to, the territories concerned; by reason of the incorporation of these territories in the dominions of the British Crown; by virtue of their formal constitution in the Royal Letters Patent of 1908 and 1917 as the British Possession called the Falkland Islands Dependencies: the United Kingdom possesses, and at all material dates has possessed, the sovereignty over the territories of the Falkland Islands Dependencies, and in particular the South Sandwich Islands, South Georgia, the South Orkneys, South Shetlands, Graham Land and Coats Land;
- (2) that the legal titles of the United Kingdom to the Falkland Islands Dependencies, and in particular to the South Sandwich Islands, South Georgia, the South Orkneys, South Shetlands, Graham Land and Coats Land, are, and at all material dates have been, superior to the claims of any other State, and in particular to those of the Republic of Argentina;

- (3) that, in consequence, the pretensions of the Republic of Argentina to the South Sandwich Islands, South Georgia, the South Orkneys, South Shetlands, Graham Land and Coats Land, and her encroachments and pretended acts of sovereignty in those territories are, under international law, illegal and invalid.
46. The Government of the United Kingdom, therefore, asks the Court to declare—
- (1) that the United Kingdom, as against the Republic of Argentina, possesses, and at all material dates has possessed, valid and subsisting legal titles to the sovereignty over all the territories comprised in the Falkland Islands Dependencies, and in particular South Sandwich Islands, South Georgia, the South Orkneys, South Shetlands, Graham Land and Coats Land;
 - (2) that the pretensions of the Republic of Argentina to the territories comprised in the Falkland Islands Dependencies, and in particular South Sandwich Islands, South Georgia, the South Orkneys, South Shetlands, Graham Land and Coats Land, and her encroachments and pretended acts of sovereignty in or relative to any of those territories are, under international law, illegal and invalid;
 - (3) that the Republic of Argentina is bound to respect the United Kingdom's sovereignty over the territories comprised in the Falkland Islands Dependencies, and in particular South Sandwich Islands, South Georgia, the South Orkneys, South Shetlands, Graham Land and Coats Land, to cease her pretensions to exercise sovereignty in or relative to those territories and, if called on by the United Kingdom, to withdraw from them all or any Argentine personnel and equipment.

APPLICATION BY THE GOVERNMENT OF THE UNITED KINGDOM OF GREAT
BRITAIN AND NORTHERN IRELAND RELATIVE TO THE ENCROACHMENTS OF THE
GOVERNMENT OF CHILE IN BRITISH ANTARCTIC TERRITORY

The wording of much of this Application is the same as in that relating to Argentina, quoted above. Whenever relevant, the words "Chilean" or "Chilean claim" and the date "1940" are substituted for "Argentina" or "Argentine claim" and "1925" or "1937" (for example, in paragraph 34 of the Application relating to Argentina). In addition, since there have been no Chilean encroachments in the South Orkney Islands, mention of that group has not been included in the Application relating to Chile as, for example, in paragraphs 33 and 43 of that relating to Argentina. Only those paragraphs concerned with specific Chilean claims and encroachments are quoted in full below, with their original numbering.

Limits of the dispute with Chile

Paragraphs 3 and 4 of the Application relating to Argentina are replaced by the following extract which defines the limits of the dispute with Chile:

3. Notwithstanding the United Kingdom's open assumption, and long-standing and peaceful exercise of sovereignty over the territories concerned, and the clear and precise delimitation of the Falkland Islands Dependencies in the above-mentioned Letters Patent, the Government of the Republic of Chile in the above-mentioned Presidential Decree made the following announcement:—

"All lands, islands, islets, reefs of rocks, glaciers (pack-ice) already known, or to be discovered, and their respective territorial waters, in the sector between longitudes 53° and 90° West, constitute the Chilean Antarctic or Chilean Antarctic territory."

The Decree, the full text of which in Spanish and English is set out in Annex 1 (No. 3), refers in terms only to *Antarctic* territory, but Chile's subsequent encroachments on British territory in the South Shetlands and at the northern extremity of Graham Land lead the Government of the United Kingdom to infer that the pretensions formulated in the Chilean Presidential Decree also extend to all territories within the specified sector between longitudes 53° and 90° West, including those situated *outside* the Antarctic Circle.

4. The western limit of Chile's pretensions, as proclaimed in the Presidential Decree, is longitude 90° West, whereas the western limit of the Falkland Islands Dependencies is longitude 80° West. The United Kingdom's present Application to the Court does not, therefore, concern Chile's pretensions in the areas between longitudes 80° and 90° West, which lie outside the limits of the Falkland Islands Dependencies. The eastern limit of Chile's pretensions, as proclaimed in the Presidential Decree, is longitude 53° West, whereas the eastern limit of the Falkland Islands Dependencies is 33 degrees further to the east at longitude 20° West. The United Kingdom's present Application does not, therefore, concern the areas of the Falkland Islands Dependencies between longitudes 20° and 53° West, which lie outside the limits of Chile's pretensions. The northern limit of the Falkland Islands Dependencies in the longitudes in question being latitude 58° South, the United Kingdom's present Application relates to the pretensions of Chile to the sovereignty of the islands and lands of the Dependencies which lie between longitudes 53° and 80° West and to the southwards of latitude 58° South. A map depicting the territories in dispute between the United Kingdom and Chile is attached to the present Application as Annex 2 [see p. 126]. As this map shows, the principal territories in dispute between the two countries are the South Shetland Islands and Graham Land together with its coastal archipelagos.

Paragraphs 26–29 of the Application relating to Argentina are replaced by the following:

*Announcement of Chile's pretensions to the South Shetlands
and Graham Land on November 6, 1940*

26. The Chilean Government, as related in paragraph 24 (3) [see the same paragraph in the Application relating to Argentina] above, made no protests or reservations in respect of the issue of the British Letters Patent of 1908, or those of 1917, or in respect of the frequent and public display of State authority by Great Britain in and in regard to the Dependencies. For more than 30 years after the issue of the Letters Patent of 1908, no interest was shown by the Chilean Government in the South Shetlands or Graham Land. The only Chilean interest in those territories during this period was that of the whaling company, the Sociedad Ballenera de Magallanes which, as mentioned in paragraph 24 (3) above, took out British whaling licences for the two territories between 1907 and 1914, and conducted their operations under British laws and regulations. Although one of the principal objects of the important international conferences for the regulation of whaling held between 1927 and 1939 was the preservation of the whale stocks in the seas surrounding the Dependencies, and especially in Bransfield Strait between the South Shetlands and Graham Land, Chile neither took any part in those conferences nor acceded to the resulting conventions, which, if she had had sovereignty over these territories she might be expected to have done. Nor did she voice any objection to the fact that the United Kingdom took a leading part in those conferences in its capacity as the State responsible for the regulation of whaling in the Dependencies, and especially in the South Shetlands and Graham Land. It was only after the outbreak of the

second world war that the Chilean Government, by a decree of September 7, 1939, established a special commission to examine into Chile's interests in the Antarctic. Thirteen months later, the Chilean Government issued the Presidential Decree of November 6, 1940, the text of which is given in paragraph 3 of the present Application, and by this decree laid claim, *inter alia*, to the British territories of the South Shetlands and Graham Land.

Rejection of the Chilean pretensions by the United Kingdom

27. The British Ambassador in Santiago, a few days after the issue of the Presidential Decree of November 6, 1940, drew the attention of the Chilean Government to the fact that Chile's pretensions in the Antarctic encroached upon British territory in the Falkland Islands Dependencies. Subsequently, in a diplomatic Note of February 25, 1941, the United Kingdom Government lodged a formal protest with the Chilean Government against the Presidential Decree, declaring that it could not recognise that Decree as conferring title on the Republic of Chile to any territory within the limits of the Falkland Islands Dependencies.

Paragraphs 32 and 33 of the Application relating to Argentina are replaced by the following:

Chile's persistence in the pretensions advanced in the Presidential Decree of November 6, 1940, and her subsequent physical encroachments on the British territories of the South Shetlands and Graham Land

30. In a Note to the United Kingdom Government of September 29, 1944, the Chilean Government, in connexion with the issue of British postage stamps for the South Shetlands and Graham Land, drew attention to the fact that these territories were covered by the terms of the Chilean Decree of November 6, 1940. In a further Note of January 23, 1946, the Chilean Government at length replied to the United Kingdom's protest of February 25, 1941, against the claims apparently made by Chile in that Decree to British territories. The Chilean Government contended, *inter alia*, that it had never been officially notified of the text of the British Letters Patent of 1917, and that the regions in question had always been held to be Chilean on geographical, juridical, historical, diplomatic and administrative grounds. Mention was also made of an award given by His Majesty King Edward VII in 1902, in a boundary arbitration between Argentina and Chile, in consequence of which, it was stated, the regions now in question had been considered by Chile as incorporated in her national economy, and she had issued various—unspecified—decrees relating to "occupation, fishing rights, &c." In a Note of November 11, 1946, the United Kingdom Government replied to the Chilean assertions, pointing out, *inter alia*, that

- (1) The British Letters Patent of 1917 were by their nature open and public documents, and had in fact been published in the *Falkland Islands Gazette*, and in *British and Foreign State Papers* (Volume 111, pages 16-17).
- (2) The United Kingdom's attitude was in no way based solely on the Letters Patent of 1917, but also on the long-standing responsibilities which it had assumed for the administration of the territories, for the equitable control of whaling and sealing, and for the accumulation of scientific and meteorological data. The only recorded Chilean enterprise in the area in question had operated entirely under British licence.
- (3) The alleged "geographical grounds" for a Chilean title were without any basis in international law, and were in contradiction with the decision in the *Island of Palmas* arbitration.

- (4) Having regard to accepted usage and law, British discoveries, British scientific investigations in the area, British administrative activity and the continuity of the British display of the functions of a State, all "juridical," "historic" and "administrative" factors would seem to point unreservedly to British sovereignty.
- (5) The boundary arbitration of 1902 between Argentine and Chile related solely to the continent of America, and in the course of it nothing was ever said by either party about claims to Antarctic territory.

For the purposes of the present Application, it suffices to add that in the subsequent diplomatic correspondence the United Kingdom and Chile have maintained their respective positions.

31. The Chilean Government, however, has not remained content with challenging the United Kingdom's titles to the South Shetlands and Graham Land in diplomatic correspondence. It has proceeded to establish in these British territories the following Chilean posts:—

South Shetlands—

Discovery Bay, Greenwich Island (1947)
Pendulum Cove, Deception Island (1955)*

Graham Land—

Cape Legoupil, Trinity Peninsula (1948)
Paradise Harbour (1951)

Protests against these Chilean encroachments on British territory have been lodged by the United Kingdom, both through the diplomatic channel, and locally by officials of the British administration in the Falkland Islands Dependencies. The Chilean Government has nevertheless maintained the above-mentioned posts in the South Shetlands and Graham Land, and has repeatedly stated or manifested its intention to continue to disregard the United Kingdom's prior and well established legal titles to those territories.

The contentions and claims of the United Kingdom Government in the case

Finally, in place of paragraph 46 of the Application relating to Argentina, the United Kingdom Government, in the case against Chile [paragraph 44], asked the Court to declare:

- (1) that the United Kingdom, as against the Republic of Chile, possesses, and at all material dates has possessed, valid and subsisting legal titles to the sovereignty of the South Shetlands and Graham Land;
- (2) that the pretensions of the Republic of Chile to the South Shetlands and Graham Land and her encroachments and pretended acts of sovereignty in or relative to those territories are, under international law, illegal and invalid;
- (3) that the Republic of Chile is bound to respect the United Kingdom's sovereignty over the South Shetlands and Graham Land, to cease her pretensions to exercise sovereignty in, or relative to those territories and, if called on by the United Kingdom, to withdraw from them all or any Chilean personnel and equipment.

* The very recent character of this encroachment will be noted. An attempt, in February 1953, to establish a Chilean hut on the actual ground of the existing British base on Deception Island met with forcible resistance....

ANNEXES TO THE APPLICATIONS

[not reproduced here]

Annex I

[The first number relates to Argentina; the second to Chile.]

No.

- (1) (1) Letters Patent of 21 July 1908. *British and Foreign State Papers, 1907-08*, Vol. 101, (London, 1912), p. 76-77. [Reprinted in the *Polar Record*, Vol. 5, Nos. 35/36, 1948, p. 241-42.]
- (2) (2) Letters Patent of 28 March 1917. *British and Foreign State Papers, 1917-18*, Vol. 111, (London, 1921), p. 16-17. [Reprinted in the *Polar Record*, Vol. 5, Nos. 35/36, 1948, p. 242-43.]
- (3) Presidential Decree of the Republic of Chile of 6 November 1940. Translation from Oscar Pinochet de la Barra: *La Antártida Chilena*. Santiago, 1944, p. 23-24.
- (3) (4) Letters Patent (Charter) of 23 June 1843. *Patent Roll 7 Vict. Part 1*, C. 66/4690.
- (4) (5) Commission issued to the Governor of the Falkland Islands in November 1847. *London Gazette*, No. 20801, 30 November 1847, p. 4435.
- (5) (6) Summary of the Whaling Laws in force in the Falkland Islands Dependencies in 1920. (Annexure 3 to Appendix 5 on p. 59-60 of *Report of the Interdepartmental Committee on Research and Development in the Dependencies of the Falkland Islands*. . . . London, H. M. Stationery Office, 1920. [Command Paper No. 657.]

Annex II

Map of the Falkland Islands Dependencies [a similar map is on p. 126].

FIELD WORK

SWEDISH EXPEDITION TO SVALBARD, 1954

[Summarized from *Ymer*, Årg. 75, Häfte 2, 1955, p. 121-37.]

In the summer of 1954 an expedition from Uppsala University went to the Tempelfjorden area in Vestspitsbergen in order to carry out geomorphological and biological studies. Its members were:

Fil. mag. Anders Rapp, Geomorphologist
Docent Åke Holm, Zoologist
Fil. kand. Tage Roos, Entomologist
Hans-Erik Dahl (Norwegian), Assistant

The party travelled to Longyearbyen on the *Lyngen* from Tromsø, and from there on the *Nordsyssel* to Bjonahamna on the north side of Tempelfjorden, where base was set up on 9 July.

Heights, slope angles and depths of Templet's talus cones were measured, and comparison of photographs taken by this expedition with those of Swedish expeditions some 50 years ago shows little or no evidence of movement of material in the cones, nor any development of the vegetation patches. Observation of a sunken beach spit in Bjonahamna seems to indicate that the land has sunk about 4-5 m. in postglacial times. Meteorological records were also made for 24 days.

The biologists collected spiders and insects and studied the ecology of the lower fauna.

The programme was completed by visits in the expedition's boat (equipped with outboard motor) to Bjonadalen, Von Postbreen, Gipsdalen, Gåsøyane (at the mouth of Billefjorden) and Sassendalen.

The party returned to Longyearbyen in the *Nordsyssel* on 2 August.

ARCHAEOLOGICAL INVESTIGATIONS ON MELVILLE PENINSULA, 1954

[Summarized from information provided by Jørgen Meldgaard and Richard Emerick.]

Between 19 May and 21 September 1954 an expedition, sponsored by the Danish Nationalmuseum, the Pennsylvania University Museum and the Arctic Institute of North America, investigated paleo-eskimo sites in Melville Peninsula and other areas in Foxe Basin. The members were Jørgen Meldgaard of the Danish Nationalmuseum, Richard Emerick of the Pennsylvania University Museum and Father G. Mary-Rousellier.

Nine sites were examined, at the largest of which, at Alarnerk in the north-west of Melville Peninsula, 208 houses and some graves of the Dorset culture were excavated. The houses had been rectangular in shape, some as large as 7 by 14 m., and were built on elevated terraces from 8 to 22 m. above the present sea-level. On the same site, at levels of 4 to 9 m., remains of Thule culture were found. The artifacts collected at the different levels on this site thus enabled the evolution of Dorset culture to be studied from an early period until the period of contact with the Thule culture.

At Cape Elwyn, on Jens Munk Island, remains of a still earlier culture were

recorded on terraces 38 to 52 m. above sea-level. These stone and bone artifacts differed from those of the Dorset culture, and resembled those of the Sarqap phase¹ and other paleo-eskimo finds in Greenland.²

CANADIAN "OPERATION NORS 1", 1954

[Summarized from *Marine activities in the north* (Ottawa, Department of Transport), Season 1954, p. 5-9. Accounts of the relief of the joint Canadian-United States weather stations in the Canadian Arctic between 1949 and 1952 were given in the *Polar Record*, Vol. 6, No. 44, 1952, p. 518-20; and Vol. 7, No. 51, 1955, p. 489.]

The relief of the joint Canadian-United States weather stations in the Canadian Arctic was carried out entirely by Canadian ships for the first time in 1954, and was known as "Operation Nors 1".

The C.G.S. *d'Iberville*, Captain C. A. Caron, escorting the S.S. *Gander Bay* and M/V *Maruba*, left Quebec on 31 July. On 6 August, off Cape Chidley, the C.G.S. *N. B. McLean*, W. Dufour, master, joined the convoy from Hudson Bay, and the four ships together reached Resolute on 12 August. Here they were met by C.G.S. *C. D. Howe*, Captain P. M. Fournier, master. The *Gander Bay* was discharged and re-loaded for Montreal, and some cargo was also unloaded from the *d'Iberville*. The convoy then broke up and the *d'Iberville* went on alone to Eureka, on 15 August, arriving on the 20th. Bad weather and heavy ice were encountered throughout the voyage, and at Eureka the vessel was forced to lift anchor and move continually in order to keep in comparatively clear water. Light cargo was unloaded by helicopter, and heavy cargo by means of self-propelled barges. On 23 August the *d'Iberville* left Eureka and on 4 September met the *N. B. McLean* at Wakeham Bay.

Meanwhile, the *N. B. McLean* escorted the *Gander Bay* and *Maruba* to Padloping and, leaving there on 27 August, took them to an agreed point off Resolution Island, from which they returned south alone. She then met the *d'Iberville* and refuelled from her, returned to her station patrolling Hudson Bay and Strait, and finally got back to Quebec on 17 October. After meeting the *N. B. McLean* at Wakeham Bay the *d'Iberville* went on south and reached Quebec on 12 September.

CANADIAN EASTERN ARCTIC PATROL, 1954

[Summarized from *Marine activities in the north* (Ottawa, Department of Transport), Season 1954, p. 1-2. A note on the supply of these settlements in 1953 was published in the *Polar Record*, Vol. 7, No. 50, 1955, p. 391-93.]

The C.G.S. *C. D. Howe* sailed from Montreal on 25 June with 764 tons of cargo for eighteen stations in the Canadian Arctic. The officer in charge of the Eastern Arctic Patrol from Montreal to Churchill was B. G. Sivertz, Chief of the Arctic Division of the Department of Northern Affairs and National Resources; after Churchill he was replaced by A. Stevenson. Other government officials on the patrol were Dr R. N. Simpson, in charge of a National Health and Welfare Department party, R. B. Campbell and K. Williams, hydrographers from the Department of Mines and Technical Surveys, G. Henderson of the Post Office Department, E. N. Grantham, Department of Northern Affairs' education officer, and an inspector of the Royal Canadian Mounted Police.

On 14 July the *C. D. Howe* joined the *N. B. McLean* at Erik Cove, and 380 tons of fuel were transferred to her; the *C. D. Howe* then went on to reach Churchill on the 22nd to refuel and load cargo. After calling at Coral Harbour, Arctic Bay, Pond

¹ Jørgen Meldgaard, *American Antiquity*, Vol. 17, No. 3, 1952, p. 222-30.

² Eigil Knuth, *American Antiquity*, Vol. 19, No. 4, 1954, p. 367-81.

Inlet and Clyde she reached Resolute on 10 August where she was joined by the ships of Operation Nors I. She sailed from Resolute on the 21st bound for Arctic Bay, Craig Harbour and Padloping.

Then, because the meteorological station at Clyde had been burnt down she was ordered back to Churchill to load emergency supplies for the new station. She met the *d'Iberville* on 3 September in Wakeham Bay, where fuel was embarked and passengers transferred to the *d'Iberville*. She went on to Churchill, delivered cargo at Clyde and returned south, reaching Quebec on 25 September after a voyage of 12,617 miles.

EXPEDITIONS OF NORSK POLARINSTITUTT TO SVALBARD AND NORTH-EAST GREENLAND, 1955

[Summarized from notes provided by Norsk Polarinstitut. Previous reports were given in the *Polar Record*, Vol. 7, No. 47, 1954, p. 44-46 (seasons of 1951 and 1952), and Vol. 7, No. 50, 1955, p. 394-95 (seasons of 1953 and 1954).]

Svalbard, 1955

The expedition, under the leadership of Lieutenant-Commander Reidar Lyngaas, left Åndalsnes on 2 July 1955 in the m/s *Minna*. On 8 July a call was made at Kapp Linné to deliver a new motor boat to the meteorological station there, and geological parties were landed to work in the Isfjorden district. Harald Major undertook geological mapping in the upper part of Adventdalen and north of the entrance to Isfjorden, from Trygghamna to Farmhamna, while Thore Winsnes worked from Trygghamna to Ekmanfjorden. Meanwhile, Lyngaas surveyed the area around Raudfjorden and took soundings between Amsterdamøya and Raudfjorden north towards the ice edge. Helge Hornbeck carried out echo-sounding west of Danskøya and Amsterdamøya, and at the entrance to Smeerenburgfjorden.

On 18 July Lieutenant-Commander Kaare Lundquist took over leadership of the expedition and inspected lights and radio beacons in the *Minna*. He also took Gösta Liljequist and Dr V. Rossi to Murchisonfjorden, in Nordaustlandet, in search of a site for the Swedish International Geophysical Year station.

The *Minna* arrived back in Åndalsnes on 2 September.

Relief expedition to north-east Greenland, 1955

This annual expedition, led by John Giæver, left Ålesund on 23 July on the *Polarbjørn*. Calls were made at Jan Mayen, Myggbukta and all the Norwegian hunting stations from Davy Sund to north of Clavering Fjord. The *Polarbjørn* arrived back at Ålesund on 29 August.

BRITISH UNIVERSITY ARCTIC EXPEDITIONS, 1955

Cambridge Expedition to Northern Ny Friesland, 1955

[Summarized from information provided by J. I. Edwards. Notes on recent work by Cambridge expeditions to Spitsbergen were published in the *Polar Record*, Vol. 5, No. 40, 1950, p. 612-13 (season of 1949); Vol. 6, No. 46, 1953, p. 800-03 and 804-05 (season of 1951 and 1952); Vol. 7, No. 48, 1954, p. 151 (season of 1953) and No. 51, 1955, p. 491-2 (season of 1954).]

The object of this expedition was to complete the geological and survey work carried out by previous parties in the Ny Friesland peninsula. Members were:

M. B. Bayly, Leader and geologist
W. I. Dickinson, Surveyor

J. I. Edwards, Surveyor
C. B. Wilson, Geologist

The party, except for Wilson, reached Tromsø on 16 July in H.M.S. *Vidal*, then Longyearbyen in the *Lyngen*, and Sorgfjorden on 24 July in the *Nordsyssel* belonging to the governor of Spitsbergen. There they were joined by Wilson, who had been sledging up from Brucebyen with one companion since May. A base camp was made at the Bangenhuk hut in Mosselbukta from which survey and geological trips were made, between intervals of extremely bad weather, until 28 August. During this period twenty stations were occupied by the surveyors, and photographic panoramas made from fourteen of them, while the geologists examined the area south of Mosselbukta and made some significant fossil discoveries in the metamorphosed rocks at Heclahuken. The party was then picked up by the Norwegian sealer *Isblink* and taken to Tromsø, and thence to Greenock in H.M.S. *Vidal*.

Cambridge Expedition to east Greenland, 1955

[Summarized from information provided by J. H. Latter.]

Between 20 July and 12 August a party visited Jameson Land, east Greenland, in order to ring Pink-footed Geese [*Anser brachyrhynchus*] and Barnacle Geese [*Branta leucopsis*] as part of an investigation into the migratory habits of these species. Members were J. B. Latter (leader), E. A. Sayers and R. Webbe of Cambridge University; F. T. Bolin, Oslo University; and H. Street of Birmingham University.

The party met in Iceland and went on by air to Mesters Vig and thence to Antartics Havn by boat. Bad weather delayed them and they arrived at their base at Fleming Fjord much later than planned. However they succeeded in ringing 10 Pink-footed Geese and some 300 Barnacle Geese.

Cambridge Expedition to Lapland, 1955

[Summarized from information supplied by C. H. Fraser Rowell.]

During the summer of 1955 this expedition spent five weeks in Swedish Lapland, in an area surrounding the mountain Selkävaara and two lakes Selkäjärvi and Taavajärvi, in approximately lat. $68^{\circ} 27' N.$, long. $20^{\circ} 47' E.$

The members were:

M. I. H. Chipchase, Botanist	C. H. Fraser Rowell, Plant ecologist and
S. J. F. Davies, Ornithologist	ornithologist
T. E. Giles, Mammalogist	J. P. S. Pringle, Entomologist

The object of the expedition was an ecological survey of the vegetation, a study of the distribution of the birds and detailed observation of three species, mammal and insect studies, and studies of the pollination of certain plants.

The party travelled by train to Kiruna from Göteborg, and thence to Selkäjärvi by ski-plane on 14 June. On the return journey they walked to Laimoviken on 21 July, and crossed Torneträsk to reach the railway station at Kiruna.

Nottingham University Expedition to Northern Vestspitsbergen, 1955

[Summarized from information provided by M. Mellor.]

During the summer of 1955 an expedition from Nottingham University carried out glaciological and geological work in and around Kongsfjorden, and on the ice cap east of the fjord, in Vestspitsbergen.

Members of the expedition were:

M. Mellor, Leader, surveyor
B. S. Cooper, Geologist
M. F. Howells, Geologist

R. S. Knight, Deputy Leader
E. Lawrence, Geologist
B. N. Winterbottom, Surveyor

Mellor, Knight and Winterbottom surveyed on Kongsbreen and Blomstrandbreen, and mapped the ice cliffs of Fjortende Julibreen from Krossfjorden. Lawrence, Howells and Cooper studied rock formations and surveyed Lovénøyane.

ARCTIC CRUISE OF H.M.C.S. *LABRADOR*, 1955

[Summarized from the *Gazette* (Montreal) of 17 November 1955 and the *Halifax Mail-Star* of 18 November 1955. A description of the H.M.C.S. *Labrador* and an account of her 1954 cruise were published in the *Polar Record*, Vol. 7, No. 50, 1955, p. 399 and 413-14.]

H.M.C.S. *Labrador*, Captain O. C. S. Robertson, R.C.N., left Halifax on 1 June 1955 for her second cruise in Canadian eastern arctic waters. A number of alterations had been made to the vessel since her return from her cruise round North America in 1954: the flight deck had been lengthened, a larger hanger built for helicopters, and a hydrographic office, laboratories and more accommodation added. She now carried 25 officers, 13 scientists, 222 crew and 3 helicopters.

Her main assignment on this voyage was to serve as senior ship of a task force of 14 ships delivering supplies and equipment to Distant Early Warning (D.E.W.) sites in the Foxe Basin area, and to carry out survey work there and in Hudson Bay.

Heavy ice was first met on 9 June in the Strait of Belle Isle, and continued throughout the passage of Davis and Hudson Straits. Off Cape Dorset the vessel anchored for a few days and W. D. Forrester was flown to Salisbury Island where a number of astronomical fixes were made. Reaching Coral Harbour on 28 June the *Labrador* cleared a passage through the ice to allow survey parties to be landed on the beach. She left Coral Harbour on 3 July and by the 7th had broken through to Foxe Channel and was in the vicinity of Cape Fisher on the east coast of Southampton Island. Cape Fisher had been selected as the site for a navigational control station (E.P.I.) to be established by the *Labrador*. Ice conditions, however, were such that no boat of any type could approach shore so the whole operation was carried out by helicopter. In about 20 hours a lift of 28,640 lb. (13,000 kg.) was completed while the *Labrador* lay four miles off-shore. On 12 July another navigational control station was installed, though with considerably more difficulty, at Cape Enaulik, Baffin Island, on the opposite side of Foxe Channel. These stations were manned from the U.S. Naval Electronic Laboratory, San Diego, and operated until September, when they were evacuated by U.S.S. *Atka*, after playing a most important part in the charting of Foxe Basin.

The *Labrador* then went to the site of what is to be one of the largest D.E.W. stations, where a survey of the anchorage was made and a beach, suitable for use by landing craft, was found. She then returned to Coral Harbour to join the remainder of the task force, supplying the E.P.I. stations at Cape Fisher and Cape Enaulik on the way. After a visit to Chesterfield Inlet with the survey ship U.S.S. *Pursuit*, the *Labrador* spent the rest of August convoying the supply ships from site to site until 30,000 tons of cargo had been delivered and the ships had returned south.

During September and October the *Labrador* continued hydrographic work in Foxe Basin in preparation for the next season's operations. Late in October Captain Robertson became ill and the ship returned to Coral Harbour where he was landed and flown to Montreal. Commander J. M. Leeming replaced him and the *Labrador* continued with hydrographic and oceanographic surveys in Hudson Strait, thence returning to Halifax on 17 November.



Camp and helicopter near Goose Fiord, Ellesmere Island



Camp and helicopter at the edge of the Parrish Glacier, Copes Bay, Ellesmere Island
 "Operation Franklin", 1955

*Photographs Geological Survey of Canada by E. F. Roots
 (Facing p. 157)*

CANADIAN "OPERATION FRANKLIN", 1955

[Note provided by Dr E. F. Roots and published by permission of the Acting Deputy Minister, Department of Mines and Technical Surveys, Ottawa, Ontario, Canada.]

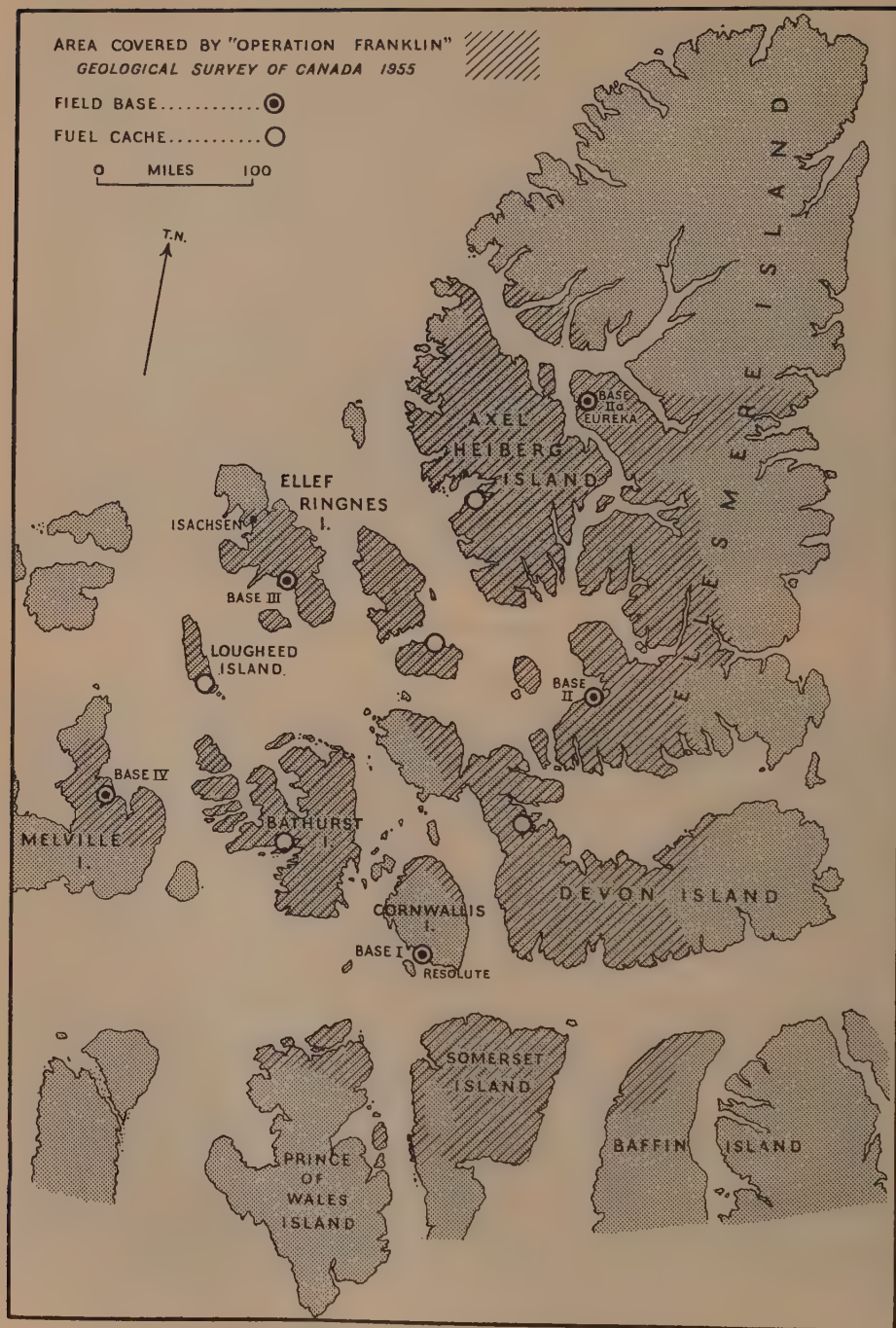
The field investigations of the Geological Survey of Canada in the Canadian arctic islands have, in the past, been of two types: traverses in the spring and early summer, using dog teams on the unbroken sea ice and snow-covered land; and the examination of coastal areas by parties working from boats during the short season of open water in those favoured places where the sea-ice clears sufficiently to permit the passage of vessels. Both methods have obvious limitations, and there were large areas, particularly in the Queen Elizabeth Islands, that had never been visited by a geologist.

In 1954, the Geological Survey was asked to accelerate its mapping programme in the arctic islands, and a comprehensive reconnaissance survey, which became known as "Operation Franklin", was planned under the direction of Y. O. Fortier. The operation was based on air transport of a number of small teams of geologists, who were to carry out detailed examination of carefully selected strategic localities. The familiar "bush" aeroplane could not be used for this work because there are few lakes, the sea ice is too rough and unpredictable, and the bare land too rough or too boggy to be used as a landing-field. Small helicopters, such as are used extensively for geological work in other parts of Canada and elsewhere, were unsuitable, because of their limited flight range and because no support aircraft could accompany and service them. Large, long-range helicopters, however, can work unaided if fuel and stores depots are established in advance; and thus the operation became dependent on two Sikorsky S-55s, the largest helicopters in civil operation at the present time.

Fuel and supplies were shipped to Resolute and Eureka during the regular sea-supply of the Arctic bases and weather stations in the summer of 1954. During the following winter, air photographs of the entire area were studied and interpreted in the light of what geological information was then available; photo-geological maps were prepared for each island, and the key areas for ground investigation outlined. The logistics of the entire operation were worked out as far as possible in advance, in order to determine what was physically feasible, and to inter-relate the complications of movement, supply, and geological requirements. It was planned to include in the survey all of the Queen Elizabeth Islands with the exception of the eastern part of Devon Island, the eastern and northern part of Ellesmere Island, Prince Patrick Island, and the western part of Melville Island; and to include also Prince of Wales Island, most of Somerset Island, and the north-west tip of Baffin Island.

Three main field bases, in addition to an initial base at Resolute and a subsidiary base at Eureka, and five main fuel caches, were to be established. Early in April 1955, the first men went to Resolute to prepare these. Using a DC-3 aircraft equipped with ski-wheels, three parties, each comprising a geologist, his assistant, an Eskimo and dog-team, were set down on Ellesmere, Ellef Ringnes, and Melville Island respectively. These parties were to haul fuel and supplies, brought by DC-3 to the nearest available landing place, to the site of the base for summer helicopter operations; and were also to make dog-sledge journeys in the surrounding country to establish the local geology. By the first week in June, more than 100 tons of fuel and supplies were distributed through the islands, and the sledging parties had made a good start in mapping the geology from each of the bases. The preliminary "cache" phase of the operation was now completed, and the DC-3 returned to the south. The snow had by this time largely disappeared from the land, and the sea ice was becoming too soft to permit the landing of heavy aircraft.

The helicopters were carried by the Royal Canadian Air Force to Resolute, where



Map to illustrate "Operation Franklin", 1955.

they were assembled, and began the main survey phase of the operation on 13 June 1955. Nine ground parties, of two men each, were set down at stations selected in advance, and after three to ten days, having completed their investigations at that place, each was moved to a new locality. In this manner the entire operation advanced, leap-frog fashion, through the islands and from island to island. Three geologists were attached to the main base as mappers; one accompanied every helicopter flight, noting rock types and structures that could be related to the detailed investigations of the ground parties and so fill in the map. Towards the end of June, two parties that had been working with dog teams on Somerset Island were brought back by helicopter; thereafter the whole operation was dependent on the two helicopters for transportation.

The operation described a large counter-clockwise loop through the Queen Elizabeth Islands, starting south, east, and north-east from Resolute, occupying the field bases in succession, and finally, in September, approaching Resolute from the north-west. In places the geology was found to be so complex that in order to investigate it properly extensive traverses had to be made on foot, with the geologists carrying food and camping equipment on their backs. Some of these foot journeys were as long as three weeks. The helicopters helped by flying over the route beforehand and setting down food caches, and by picking up specimens deposited along the way.

In the course of the operation, approximately 150 hours were flown with ski-wheel aircraft and 500 hours with helicopters, exclusive of the flying from southern Canada to Resolute. The geology was observed and investigated over a land area of about 80,000 square miles, and by careful interpretation of air photographs in the light of this information a reasonable estimate of the geology may be made for another 40,000 square miles. Thus for a region that was previously almost unknown, about as large as the British Isles, there is now reliable information concerning its geology and mineral possibilities. In addition, in some seventy places throughout the arctic islands, careful and detailed geological sections and standards have been established, upon which future investigators can base their work.

As a supplement to the systematic mapping of rocks and mineral occurrences, the airborne geophysical surveys of the Geological Survey of Canada were integrated with "Operation Franklin". A Canso aircraft, belonging to the Geological Survey, made numerous extensive flights over the islands and the Arctic Ocean, recording changes in the magnetic and radioactive field of the rocks beneath. With the help of this information, observations made on the surface become more significant, and it is possible to project the geology between islands and under snowfields with greater confidence.

The condition, extent, and movement of sea ice in the area was recorded throughout the summer; regular meteorological observations were made for comparison with those at the established weather stations; and a log was kept of the numbers and behaviour of all the larger animals seen.

The technical results of the operation will be published by the Geological Survey of Canada.

The personnel of "Operation Franklin" included:

Geological Survey of Canada

Y. O. Fortier, geologist, mapper, in charge of the operation	N. J. McMillan, Geologist
R. G. Blackadar, Geologist	A. W. Norris, Geologist
B. F. Glenister, University of Western Australia, Geologist	E. F. Roots, Geologist
H. R. Greiner, Geologist	J. G. Souther, Geologist
D. J. McLaren, Geologist	R. Thorsteinsson, Geologist
	E. T. Tozer, Geologist
	T. E. Ling, Radio engineer

M. E. Woakes, Senior assistant
 R. G. Craig, Assistant
 A. W. Kerr, Assistant
 R. G. Kessler, Assistant
 D. J. Kinley, Assistant
 R. C. McCulloch, Assistant
 D. W. Nicholson, Assistant
 W. D. Tedlie, Assistant
 G. D. Tikkanen, Assistant

Z. A. Woznura, Assistant
 P. B. M. Beyersbergen, Cook
 E. Watson, Cook
 Alec, Dog driver
 Amagooalik, Dog driver
 Jebeddie, Dog driver
 Simeanie, Dog driver
 Sudlavenick, Dog driver

Arctic Wings Limited

R. Foisey, Pilot
 E. Lloyd, Mechanic
 D. N. Lynch, Navigator

E. Patovrita, Engineer
 T. Patterson, Pilot
 G. Yewen, Pilot

Okanagan Helicopters Limited

F. Snell, Chief Pilot
 R. Bryant, Engineer
 G. Chamberlain, Engineer
 F. Grover, Mechanic

G. Hazell, Pilot
 K. Iverson, Pilot
 C. Kelly, Mechanic
 D. K. Orr, Pilot

The crew of the airborne geophysical survey unit included:

Geological Survey of Canada

L. W. Morley, Acting Chief of
 Geophysics Division, in command
 F. P. Du Vernet, Party chief
 J. Hulahan, Operator

D. A. Smith, Navigator
 S. Washkurak, Chief magnetic
 operator

Spartan Air Services Limited

P. Cranston, Co-pilot
 K. Fraser, Pilot

G. L. Mitchell, Engineer
 J. Kapcala, Engineer

ARGENTINE ANTARCTIC EXPEDITIONS, 1951-54

[Much of the activity recorded below was undertaken for political reasons connected with Argentine territorial claims. For the political and diplomatic aspects of this period see the *Polar Record*, Vol. 6, No. 43, 1952, p. 413-16; and Vol. 7, No. 48, 1954, p. 212-23. The following notes, admittedly incomplete, have been prepared by Ena Thomas, and are restricted to descriptions of the expeditions without reference to political or legal implications. Published sources are listed under the title of each expedition. Additional information has been extracted from press and radio reports, and translations by H. G. R. King. Some details have been checked by members of the Falkland Islands Dependencies Survey.

Previous reports on Argentine activities were given in the *Polar Record*, Vol. 6, No. 45, 1953, p. 656-62 (covering the years 1942, 1943, 1947 and 1948); and Vol. 7, No. 48, 1954, p. 159-62 (1948-51).]

Argentine activities before 1951

In November 1903, the Argentine ship *Uruguay* visited Snow Hill Island to rescue members of the Swedish South Polar Expedition, whose ship, the *Antarctic*, had been crushed in Erebus and Terror Gulf in February 1903. The *Uruguay* also visited the South Shetland Islands and made substantial improvements to the charts and sailing directions.

In February 1904, on the invitation of Dr W. S. Bruce, leader of the Scottish National Antarctic Expedition, four Argentine scientists took over the Scottish meteorological station which had been established on Laurie Island, South Orkney Islands, in 1903. The first Argentine party was transported to Laurie Island in the Scottish expedition ship, the *Scotia*, and during their first year R. C. Mossman, the

meteorologist of the Scottish expedition, remained in charge. The meteorological station on Laurie Island has since been maintained and relieved annually by the Argentine government.

Apart from these activities, and whaling and sealing carried out by an Argentine company which has operated under British licence in South Georgia since 1905, no other Argentine visits were made to the Falkland Islands Dependencies until 1942. In January of that year and again in February 1943, the Argentine transport *Primero de Mayo* visited the South Shetland Islands and west Graham Land. The next expedition took place in January 1947, when the first Argentine station in west Graham Land was established on Gamma Island in the Melchior Islands. During the next four summers, three further occupied stations were established by the annual relief expeditions—on Deception Island, South Shetland Islands (November 1947), at Paradise Harbour, Danco Coast, west Graham Land (1950), and on Barry Island, Debenham Islands, Fallières Coast (March 1951). All five stations have since been continuously manned. In addition, five refuge huts were built—in Admiralty Bay and Potter Cove, both on King George Island, South Shetland Islands (January 1948), in Neko Harbour, Andvord Bay, Danco Coast (March 1949), and in Telefon Bay and Pendulum Cove, both on Deception Island, South Shetland Islands (March–April 1949).¹

In July 1951, the Paradise Harbour station was partly destroyed by fire, but the living quarters were not damaged and the men were unharmed.

Argentine Antarctic Expedition, 1951–52

[Based on Alberto Anibal Soria: *La vida en la Antártida*. (Buenos Aires, 1954); *Revista Andina*, Año 15, No. 76, 1951, p. 36, and No 77, 1952, p. 39; article by Emilio L. Díaz in *Anales de la Sociedad Científica Argentina* (Buenos Aires), entrega 2, Febrero 1953; *Derrotero Argentino*, Parte 5, 2a Edición, 1953; and *International Hydrographic Bulletin* No. 7, July 1953, p. 236.]

In 1951–52, the Argentine Government sent another expedition to the Falkland Islands Dependencies. Its purpose was to relieve the five existing stations, to establish one additional permanent station and a number of refuge huts, and to carry out hydrographic work.

The expedition was commanded by Capitán de Fragata Emilio L. Díaz. In addition to the 1952 wintering parties, eighteen scientists accompanied the expedition for the summer season. These included Dr Zacarías Popovici and Dr Alberto Nani, biologists from the Museo Argentino de Ciencias Naturales “Bernardino Rivadavia” in Buenos Aires; Dr Pasqual and Dr Orlando, geologists from the University of La Plata; Señor Rossi, a student of the University of Buenos Aires; Señor Bonasserre, an engineer; and Dr Dara, also an engineer from the University of Cuyo.

The ships taking part were the transports *Bahía Buen Suceso*, Capitán de Corbeta Luis M. Iriarte, and *Bahía Aguirre*, the tanker *Punta Ninfas*, Capitán de Corbeta M. Sanguinetti, and the ocean-going tugs *Chiriguano*, Capitán de Corbeta O. E. Eguía, and *Sanavirón*, Capitán de Corbeta Aldo Molinari. In addition to stores and equipment, two “Grumman Goose” amphibian aircraft, equipped with Fairchild T3A cameras, were transported one at a time to Deception Island by the *Bahía Buen Suceso*.

The *Bahía Buen Suceso*, *Punta Ninfas* and *Chiriguano* sailed from Buenos Aires on 16 December 1951, reaching Ushuaia on the 23rd. They left there on the 25th, arriving at Deception Island on the 27th. On the 29th air reconnaissance indicated

¹ The positions of these stations and refuge huts are shown in the *Polar Record*, Vol. 8, No. 52, 1956, map p. 61.

that ice conditions in Antarctic Sound were good. On the 30th, therefore, the *Chiriguano* sailed for Hope Bay, and the following day a camp was established on the southern shore of the bay. Construction of a new naval station, on a site about 600 yards north-west of the evacuated F.I.D.S. station,¹ began on 14 January 1952. About fifty labourers and technicians were employed. At the same time a mole was constructed and a lighthouse, named "Faro Esperanza", was built on nearby Grunden Rock. In the following days a new hut and fuel depot for aircraft was also built near Welchness on Dundee Island.

Meanwhile, on 19 December 1951, a long-range "Avro-Lincoln" aircraft—"Cruz del Sur"—flew from Rio Gallegos to the Barry Island station and back, making a non-stop flight to drop mail. During the first half of January, the *Punta Ninfas* remained at Deception Island in charge of the relief of that station, and to give assistance to the "Grumman" aircraft. The latter were used for ice reconnaissance and carried out some air photography in the area north of lat. 65° S. The huts at Pendulum Cove and Telefon Bay were also repaired. The *Bahía Buen Suceso* relieved and re-occupied the Gamma Island and Paradise Harbour stations. She reached Gamma Island on 30 December and landed the new naval detachment, led by Teniente de Fragata Maximo Lafert. Later in the season this officer was accidentally shot in the leg and was replaced by Teniente de Fragata Daniel Canova. At Paradise Harbour, the damage caused by fire during the preceding winter was repaired, and a new mole and an additional stores hut were built. Neko Harbour was also visited at this time. The refuge hut, which had been destroyed in 1951, was rebuilt there later in the season. The *Bahía Buen Suceso* returned to Ushuaia on 8 January 1952 with the 1951 wintering parties, leaving again for the south on the 10th.

The work of the scientists during the summer season was limited mainly to those days when the ships were anchored at the various stations, but a number of them remained ashore for longer periods. Dr Popovici and Dr Nani spent three weeks on Gamma Island and about seven weeks in Paradise Harbour doing biological work; Dr Pasqual and Dr Orlando spent two weeks at Hope Bay, collecting fossils in the vicinity of Mount Flora; and Señor Rossi studied marine algae on Dundee Island for about a fortnight.

The *Sanavirón* left Buenos Aires on 15 January and, on her arrival in the Antarctic, was joined by the *Chiriguano*. Together they carried out hydrographic surveys and sounded a number of anchorages in the South Shetland Islands, the Joinville Island group and the Gerlache Strait and Bismarck Strait areas.

On 1 February the British ship *John Biscoe*, Captain W. Johnston, entered Hope Bay and work began on the re-establishment of the British station which had been evacuated in February 1949.² A party of men from the new Argentine station attempted to stop the work; they fired a machine-gun over the heads of the British party who were working ashore and, at the point of a pistol, forced them to return to the ship.³ It was not until 4 February that the British were able to continue the work of re-building their station. On that day the frigate H.M.S. *Burghead Bay*, Captain J. A. Ievers, R.N., with the Governor of the Falkland Islands aboard, reached Hope Bay. The instructions of the Argentine commander had by this time been rectified, and there was no repetition of the incident.

Early in February the *Punta Ninfas* took charge of the construction work at Hope Bay, and the *Bahía Buen Suceso* went to the South Orkney Islands to relieve the Laurie Island station. After a further visit to Hope Bay, the latter ship returned to Ushuaia in order to embark the Maritime Governor of Tierra del Fuego, Capitán de Navío Jorge E. Suaya, for a tour of the Antarctic. It was probably on this voyage

¹ See the *Polar Record*, Vol. 6, No. 41, 1951, p. 15 and 17.

² See the *Polar Record*, Vol. 6, No. 41, 1951, p. 17.

³ See the *Polar Record*, Vol. 7, No. 48, 1954, p. 213-14.

that Coronel Hernán Pujato, the Director of the Instituto Antártico Argentino, who had been responsible for the establishment of the Barry Island station in 1951, again visited the Argentine stations. Due to ice conditions in Marguerite Bay, the *Bahía Buen Suceso* was not able to reach Barry Island.

On 30 January, a naval air unit of "Catalina" flying boats, under the Command of Capitán de Fragata Pedro E. Iraolagoitia, took off from Buenos Aires for Rio Grande. They were delayed there by unfavourable weather, but on 7 February two of them flew to Deception Island. On 10 February both aircraft returned to Buenos Aires in one day, stopping only to refuel in Rio Grande. The crews of the two aircraft were:

Capitán Edgardo S. Andrew (commander)	Teniente Guillermo J. Campbell (commander)
Teniente Halfdan Hansen	Teniente Guillermo H. Ferreira
Teniente Alfredo L. Martinez Magalha	Teniente Aridio E. Grimaux
Teniente Hestor Diaz Quiljano	Teniente Roque E. Berteau
and 3 N.C.O.'s	and 3 N.C.O.'s

This flight was reported to be part of an experimental plan to establish a regular air mail service to the Antarctic.

In mid-February, the *Bahía Aguirre* left Buenos Aires with the relief party and stores for the Barry Island station. At the beginning of March she was joined in the vicinity of Adelaide Island by the *Sanavirón*. After repeated attempts, the *Sanavirón* found a route through the ice for both ships. The Barry Island station was re-victualled and the 1951 wintering party was replaced by twenty soldiers and civilians, as follows:

Mayor Juan Carlos Bassini Grande	Sargento Manuel Santos
Capitán Alberto Giovannini	Sargento Manuel Zabala
Teniente 1º José M. Vaca	Cabo Carlos Bustamante
Teniente 1º Luis Fontana	Cabo Ramón Alfonso
Teniente Federico M. Soarez	Cabo Rogelio Monzón
Suboficial auxiliar Jorge Weber	Cabo Abel Pesteriet
Sargento Enrique E. González	Cabo Roque Burgos
Sargento Mario Juan de la Torre	Hugo Parodi, civilian pilot
Sargento Antonio Osés	Carlos Manon, civilian mechanic
Sargento Ignacio Urtasim	Félix Olmedo, civilian medical officer

The ships remained at Barry Island until 17 March and had some difficulty in getting away. They did not reach open water until the 24th, and the *Bahía Aguirre* sustained some damage, but was able to reach Moon Bay in Livingston Island on the 27th.

During the second half of March, the *Chiriguano* carried out maintenance work on the existing Argentine light and navigation beacons, and constructed a number of new beacons in the vicinity of Paradise Harbour and in southern Gerlache Strait; the *Punta Ninfas* was occupied with the final disposition of personnel at stations in northern Graham Land and the South Shetland Islands; and the *Bahía Buen Suceso* paid a final visit to Laurie Island.

On 27 March the ships congregated in Moon Bay. A new hut was built on Half Moon Island, but was not occupied until the 1952-53 season. Final visits were then made to several of the stations. On 31 March the new Hope Bay station was formally inaugurated, and named "Destacamento Naval Esperanza"; the construction party was evacuated; and a party of three naval ratings and a civilian medical officer, under the command of Teniente Luis Manuel Casanova, remained in occupation for the winter of 1952.

All the ships departed on 4 April, and reached Buenos Aires on 17 April.

At an unspecified date during the summer season an independent naval reconnaissance group is reported to have visited the South Sandwich Islands. No account of these activities appears to have been published, but the two frigates—the *Hércules*, Capitán de Fragata Carlos A. Viñuales, and the *Sarandi*, Capitán de Fragata Domingo G. Luis—recorded by the Argentine Ministerio de Marina on their chart of the South Sandwich Islands, No. 111, 1ª Edición, 1953, presumably undertook this reconnaissance.

During the winter of 1952 several sledge journeys were undertaken from the Barry Island station. Very little information about these journeys has been made available, but it appears that one took place between 17 September and 4 October, when a party visited Cape Berteaux in southern Marguerite Bay. Late in December another party, led by Mayor Bassini, is reported to have reached Trail Inlet on the Weddell Sea coast after forty days. It is not known whether any scientific work or survey was undertaken.

Argentine Antarctic Expedition, 1952-53

[Based on *Revista Andina*, Año 17, No. 79, 1953, p. 29.]

In 1952-53, the Argentine Government's expedition to the Falkland Islands Dependencies was commanded by Capitán de Navío Rodolfo N. Panzarini.

The ships taking part were the transports *Bahía Buen Suceso*, Capitán de Corbeta Juan C. Balcazar, and *Bahía Aguirre*, Capitán de Corbeta Eugenio Fuentesros, the tanker *Punta Ninfas*, Capitán de Corbeta Roberto L. Arenas, and the ocean-going tugs *Chiriguano*, Capitán de Corbeta Carlos A. Brañas, *Sanavirón*, Capitán de Corbeta Ricardo S. Fitz Simon, and *Yamana*, Capitán de Corbeta Elfraín Ledesma. Two "Grumman Goose" amphibian aircraft and one "Sikorsky" S.51 helicopter were carried south by the ships.

The *Yamana* was the first Argentine ship to reach Deception Island, on 30 November 1952. She remained there until 17 December, when she crossed Bransfield Strait to relieve the Hope Bay station. The *Bahía Aguirre*, *Chiriguano* and *Sanavirón* left Buenos Aires on 3 December. In addition to the relief parties for the five Argentine naval stations, twenty-seven scientists accompanied the expedition for the summer season. The three ships reached Deception Island in mid-December, and the 1953 wintering party of eleven men was installed. Ten additional men were employed at that station throughout the summer to do the maintenance work on the aircraft. The hut in Pendulum Cove was also occupied by three men during part of the summer. The "Grumman" aircraft began ice reconnaissance and air photographic flights less than a week after their arrival at Deception Island.

On 21 December the *Yamana* relieved the Gamma Island station. By mid-January 1953, Paradise Harbour had also been relieved, the living hut enlarged, and a jetty built; additional huts had been constructed at Moon Bay, and a wintering party of one naval officer and five other ranks had occupied the station; a new light beacon, named "Faro Martín Guemes", had been installed on Harmony Point, Nelson Island, South Shetland Islands; and the scientists were beginning their work.

Meanwhile an air task force, commanded by Juan Carlos Francisco Fabri, had left Buenos Aires on 22 December 1952 for Rio Gallegos. On 11 January 1953, a "Lincoln" aircraft of this task force was seen over Deception Island. "Lincolns" were again seen on a number of occasions during the period January-March; a "Lancaster" flew south four times in February; and on 25 February two "Lincolns" and a "Lancaster" flew in formation over Deception Island, Gamma Island and Dundee Island. Early in March the air task force returned to Buenos Aires, having made nearly fifty reconnaissance flights.

On 14 January 1953 a party of men landed from the *Chiriguano* in Whalers Bay,

Deception Island, and began building a small refuge hut on the football field about 400 yards west of the British station.¹ A flag and tent were also erected. These installations were completed by the 17th and the hut was occupied by Teniente Jorge Chihigaren and three naval ratings.

During the second half of January the *Bahía Buen Suceso* spent ten days at Hope Bay, and the *Chiriguano* and *Sanavirón* made a number of visits there during the first half of February. A jetty was built and the radio tower and aërials were renewed. The 1953 wintering party, consisting of a naval medical officer, a civilian geologist Horacio A. Diaz, two army captains, two army lieutenants, two army sergeants, and six naval ratings, was under the command of Capitán de Corbeta Juan Carlos Kelly. When the *Bahía Buen Suceso* left Hope Bay she was joined by the *Bahía Aguirre*, and both ships went to Half Moon Island.

On 15 February the Argentine hut in Whalers Bay, Deception Island, was dismantled by the Falkland Islands civil authorities. The leader and one member of the occupation party were visiting the main Argentine station on the west side of Port Foster at the time; the two remaining occupants were deported.² Argentine ships were still in the vicinity, and visited Deception Island on a number of occasions during February and March, but no attempt was made to re-establish the dismantled hut. One "Grumman" aircraft, based on Deception Island, was used for air photography whenever the weather allowed up to the end of March. The helicopter was employed mainly on ice reconnaissance for the ships.

The relief of the Laurie Island party was probably completed by the *Bahía Buen Suceso* during the latter part of February, but the exact dates when visits were made to that station are not known.

The *Bahía Aguirre* and *Sanavirón* made repeated attempts during March to reach Barry Island. Earlier in the year a fire had caused some damage to that station, but no details appear to have been published. The ships had eventually to give up the attempt because of worsening ice conditions. On 21 March, therefore, the "Avro-Lincoln" aircraft, "Cruz del Sur", left Buenos Aires, and on the 26th made a non-stop flight from Rio Gallegos in order to drop essential food, medical supplies and mail for the Barry Island party.

During the latter part of March, the *Chiriguano* and a "Grumman" aircraft carried out hydrographic and air surveys in the Bismarck Strait area.

On 1 April the *Bahía Buen Suceso*, carrying the Maritime Governor of Tierra del Fuego, and the commander of the expedition and his staff, made a final visit to the Half Moon Island station. The ceremony of its official inauguration as a permanent station took place that day.

On the same day the *Bahía Aguirre* and *Sanavirón* left Deception Island, and were followed on 2 April by the *Punta Ninfas*. This ship was the last to leave. They returned to Buenos Aires on 24 April.

During the winter, the Argentine party at Hope Bay made a number of short journeys to Duse Bay, and in September and October 1953 they carried timber to a site on the west side of the bay and built a hut, which has since been occupied intermittently by parties travelling in that area and for sealing. Between 10 and 25 September 1953 three Argentines from Hope Bay visited the Chilean station at Cape Legoupil, completing the return journey in two days. In the same month a party from the Barry Island station are reported to have reached southern Adelaide Island.

¹ See the *Polar Record*, Vol. 7, No. 48, 1954, photograph facing p. 163.

² For a description of this event and a statement by the Secretary of State for Foreign Affairs in the House of Commons on 23 February 1953, see the *Polar Record*, Vol. 7, No. 48, 1954, p. 169-70, 217.

Argentine Antarctic Expedition, 1953-54

[Based on *Revista Andina*, Año 18, No. 80, 1954, p. 34; and *International Hydrographic Bulletin* No. 10, 1955, p. 467.]

In 1953-54, the Argentine Government's expedition to the Falkland Islands Dependencies was commanded by Capitán de Navío Alicia E. Ogara.

The ships taking part were the transports *Bahía Buen Suceso* and *Bahía Aguirre*, the tanker *Punta Loyola*, and the ocean-going tugs *Chiriguano*, Capitán de Corbeta Beláustegui, *Sanavirón*, Capitán de Corbeta Pernice, and *Yamana*. Two "Grumman Goose" amphibian aircraft were carried south by the ships, and operated under the command of Capitán de Navío Gregorio E. Lloret.

About twenty scientists accompanied the expedition for the summer season. These included Professor Monroy, with three students, who were invited by the Instituto Antártico Argentino to prospect for minerals. Contralmirante Juan Carlos Suárez Dóriga, the Maritime Governor of Tierra del Fuego, made a tour of the Argentine stations on the flagship, *Bahía Aguirre*. An army detachment accompanied the relief parties for the six naval stations, with a view to operating an independent army unit at Hope Bay.

The *Chiriguano* and *Sanavirón* left Buenos Aires on 26 October 1953, and were followed by the *Bahía Aguirre*, *Punta Loyola* and *Yamana* on 4 November. The *Bahía Buen Suceso* did not leave until 2 December. The ships spent some time at Ushuaia on the way south. The *Chiriguano* reached the South Shetland Islands on 16 November. The *Bahía Aguirre* followed on the 19th, and the *Punta Loyola* arrived in the area about 21 November.

The *Bahía Aguirre* and *Punta Loyola* appear to have gone at once to the Half Moon Island station; the completion of its relief was reported on 9 December. The *Chiriguano* reached Hope Bay in Trinity Peninsula on 20 November, and a working party was put ashore to build the new army hut. This was to be similar in size to, and only a few hundred yards from, the existing naval station. Before leaving Hope Bay on 26 November, the *Chiriguano* attempted to reach Dundee Island, but was prevented by ice. The *Bahía Aguirre* was at Hope Bay between 28 November and 8 December. She was joined on 1 December by one of the tugs, which later managed to reach Dundee Island, where a summer occupation party, consisting of a sub-lieutenant and two naval ratings, was installed. The "Grumman" aircraft began operations about 20 November and were frequently seen over Deception Island, Hope Bay and Admiralty Bay during the period 7 December 1953 to mid-March 1954. They were used on general reconnaissance and communication duties, and frequently for pleasure. They are also reported to have completed the air photography of northern Graham Land, north of lat. 65° S.

The *Bahía Buen Suceso* was the first ship to reach Deception Island on 22 December 1953. She was followed on the 26th by the *Punta Loyola*, which remained there until 13 January 1954. The 1954 naval wintering party at the Deception Island station consisted of Teniente Alberto Fort and ten men. The rebuilding of the Telefon Bay refuge hut was completed, and both this hut and the one in Pendulum Cove were occupied before the end of December 1953 for the summer season.

It was probably at the end of December 1953 or the beginning of January 1954 that *Bahía Buen Suceso* relieved the Gamma Island and Paradise Harbour stations, but the dates of her visits do not appear to have been published.

In November and December 1953 additional refuge huts were constructed near Cape Anna in Gerlache Strait, and in the vicinity of the Paradise Harbour station; two additional navigation beacons were erected near Paradise Harbour; and coastal surveys were carried out in the Palmer Archipelago. These tasks were probably

completed by the *Sanavirón* and *Yamana*. The latter ship was mainly concerned with the maintenance of all the light and navigation beacons. She appears to have returned to Ushuaia early in January 1954, but probably made a second voyage south later in the season.

After leaving Hope Bay on 26 November 1953, the *Chiriguano* was occupied with various tasks in the South Shetland Islands and northern Graham Land. On 6 December a refuge hut was established on Ardley Peninsula, King George Island. The Potter Cove refuge hut was extended, and then occupied for the summer season. One of the "Grumman" aircraft was based there. On 7 December a beacon was erected in Edgell Bay, and on 15 December a refuge hut was built in Harmony Cove, both on Nelson Island. On 1 January 1954, the *Chiriguano* established a new refuge hut near the north-eastern point of Snow Hill Island. On 5 January a geological party spent one day ashore in Admiralty Bay, King George Island.

During the second week in January all the Argentine ships except *Yamana* met at Deception Island. The intention was probably to co-ordinate plans for the remainder of the season. At the same time some detailed local survey was carried out. This survey, which did not extend to the whole island, provided ground control for the air photographs.

On 23 January a new refuge hut was built in Brialmont Cove on the Danco Coast of Graham Land. The refuge hut in Mikkelsen Harbour, Trinity Island, was probably established about the same time.

Meanwhile, the Argentine Navy had acquired from the United States two "Sikorsky" S.55 helicopters, which can carry ten passengers in addition to the crew of two. It was essential that the Barry Island station should be relieved during this summer since no ships had reached it since 1951-52. The *Bahía Aguirre* and *Bahía Buen Suceso* returned to Ushuaia on 15 January to collect these aircraft. The two ships, each with a helicopter aboard, reached Deception Island again on 31 January.

On 9 February the first flight to Barry Island was successfully carried out. During the following week each helicopter, operating from the deck of one of the transports, made three flights of about 150 miles over the ice to the island to relieve the party of twenty men, and to provision the station. The 1954 wintering party of four men, led by Capitán Jorge Leal, was also flown to the island. The whole operation was completed by 15 February. Although a number of attempts were subsequently made by the *Bahía Buen Suceso* and the *Sanavirón* to reach Barry Island, the ships were again unable to visit the station.

On 15 February two "Catalina" flying boats flew from Rio Grande to Deception Island. They made a number of flights from the island before returning to Rio Grande on 27 February.

Following the relief of the Barry Island station, the *Bahía Aguirre* returned to Ushuaia in order to escort the Argentine naval vessel *Les Eclaireurs* on a tour of the Argentine stations. Contralmirante Anibal O. Olivieri, the Argentine Minister of Marine, with a number of high-ranking officers, sailed from Buenos Aires in *Les Eclaireurs* on 20 February. They were escorted to Deception Island by the British frigate H.M.S. *St Austell Bay*, Commander D. C. H. Ward, R.N., on 3 March and inspected the Argentine station there. During the following week, accompanied by the *St Austell Bay* and the *Bahía Aguirre*, they visited the Half Moon Island, Hope Bay, Paradise Harbour and Gamma Island stations, and the Potter Cove summer station. At Hope Bay, on 4 March, the new army station was officially inaugurated. The 1954 army wintering party was led by Coronel Castro, and consisted of three other army officers, Capitán Narvaga, Capitán Benevides and Teniente Alvaposse; a civilian medical officer; a civilian photographer; Sargento Liki Tai; and five soldiers. The nearby naval station was manned by Capitán de Corbeta Rodrigo, leader of the party; two junior naval officers, Teniente Robiolo and Teniente

Gonzalez; a civilian medical officer, and five naval ratings. *Les Eclaireurs* completed her tour on 11 March and sailed for Buenos Aires.

The relief of Laurie Island probably took place late in the summer season. The dates when ships visited this station are not at present available.

In mid-March, most of the remaining Argentine ships sailed for Ushuaia, having first collected the men who had occupied the Potter Cove, Dundee Island and Deception Island summer refuge huts. The *Punta Loyola* was the last Argentine ship to leave Deception Island on 22 March.

During the winter of 1954 Argentine sledging activities were increased. Between 6 and 30 July six men, with two dog sledges and four "motor sledges", from the Hope Bay army detachment travelled down Crown Prince Gustav Channel as far as the Sjögren Glacier area, but did no scientific work or survey. In August, three men from the same detachment laid a depot at Cape Scott Keltie on Vega Island. This was subsequently used by a survey party which worked in the Crown Prince Gustav Channel area and southern James Ross Island. At the end of October the Chilean station at Cape Legoupil was again visited.

In July 1954 a party of men from the Deception Island station visited the refuge huts in Telefon Bay and Pendulum Cove, and in August a patrol from Half Moon Island crossed McFarlane Strait to the unoccupied Chilean refuge hut in Yankee Harbour, Greenwich Island.

Review

In April 1951 the Argentine Government created the Instituto Antártico Argentino "Coronel Hernán Pujato".¹ This was established to control and co-ordinate the work in the Antarctic; an administrative step which led to much greater efficiency.

In the years 1951-54, the Argentine expeditions not only carried out the annual relief of their five existing stations, but also established two new occupied stations—one at Hope Bay in January 1952, and one on Half Moon Island where a hut was built in March 1952, but was not permanently occupied until the following season. An independent army detachment was established near the naval station at Hope Bay in 1954. Seven new refuge huts were built, bringing the total to twelve. One of these was dismantled by the Falkland Islands civil authorities in February 1953. Of the remainder, at least five were occupied for varying periods during the summers of 1952-53 and 1953-54 for scientific work and for activities connected with flights by the naval air unit. This type of occupation marks the beginning of a new policy in the programme of Argentine activities.

While the scientific work at the occupied stations continued to be limited mainly to meteorology, the temporary employment of scientists became an accepted part of the activities during the summer seasons when useful work, particularly in the fields of geology and biology, was undertaken. Winter sledging activities were also greatly increased, although little scientific work was done.

During each summer season, the ships carried out hydrographic surveys, and constructed a number of light and navigation beacons. The aircraft were increasingly used for air photography. The results of the Deception Island survey and some of the Gerlache Strait surveys have been published by the Argentine Ministerio de Marina as charts 100, 3ª Edición 1953, and 106, 3ª Edición 1954, respectively.

During the period under review the Argentines gained considerable experience in all branches of their Antarctic activities. The planning and execution of their operations took full advantage of this increased knowledge. Nevertheless it was realized that, with their existing ships, no amount of careful planning could combat unfavourable ice conditions. Accordingly, in June 1953 the Argentine Government authorized the construction of an icebreaker. The *General San Martín*, launched at Bremerhaven in June 1954, was first used in the Antarctic during the summer of 1954-55.

¹ See the *Polar Record*, Vol. 7, No. 47, 1954, p. 80-81.

CHILEAN ANTARCTIC EXPEDITIONS, 1952-55

[The activities recorded below were undertaken primarily for political reasons connected with Chilean territorial claims. For the political and diplomatic aspects of this period see the *Polar Record*, Vol. 6, No. 43, 1952, p. 416-18; and Vol. 7, No. 48, 1954, p. 223-26. The following notes, admittedly incomplete, have been prepared by Ena Thomas, and are restricted to descriptions of the expeditions without reference to political or legal implications. Published sources are listed under the title of each expedition. Additional information has been extracted from press and radio reports, and translations by H. G. R. King. Some details have been checked by members of the Falkland Islands Dependencies Survey.

Previous reports on Chilean activities were given in the *Polar Record*, Vol. 6, No. 45, 1953, p. 665-67 (covering the years 1947-48); and Vol. 7, No. 48, 1954, p. 162-66 (1949-51).]

Chilean activities before 1952

Whaling in the South Shetland Islands was carried out intermittently by a Chilean company operating under British licence between 1907 and 1915.

The first official Chilean expedition visited the Falkland Islands Dependencies early in 1947, and established an occupied station at Discovery Bay in Greenwich Island, South Shetland Islands. It was followed by annual relief expeditions which established two further occupied stations, one at Cape Legoupil on Trinity Peninsula, north Graham Land, in January 1948, and the other in Paradise Harbour on the Danco Coast, west Graham Land, in March 1951, and an unoccupied refuge hut in Coppermine Cove on Robert Island, South Shetland Islands, early in 1950.¹ The three occupied stations have since been continuously manned.

Chilean Antarctic Expedition, 1952

[Based on *Revista Andina*, Año 15, No. 76, 1951, p. 36; and No. 77, 1952, p. 39.]

Early in January 1952, the Chilean Government despatched a sixth expedition to the Falkland Islands Dependencies. Its purpose was to relieve the Chilean stations at Discovery Bay, Cape Legoupil and Paradise Harbour.

The expedition was commanded by Comodoro Fernando Tisné. In addition to the relief parties for the three stations, General de Brigada Aérea Jorge Gana accompanied the expedition in order to inspect the members of the Chilean air force at the Paradise Harbour station.

The ships taking part were the transport *Angamos*, Capitán de Fragata Carvajal M., and the patrol boats *Lientur* and *Leucotón*. They sailed from Valparaíso on 7 January 1952, and reached Punta Arenas about ten days later. After taking on further stores and equipment they left for the South Shetland Islands, reaching Discovery Bay about 27 January.

Very few details about the relief parties or the movements of the ships during this season have been published. Teniente 1^o. DC. Julio Navarrete T. took over command of the Discovery Bay station, but other members of his party have not been named. In addition to the relief of the stations, the ships carried out some hydrographic work; the *Angamos* visited the Argentine station on Gamma Island in the Melchior Islands; an additional hut was constructed at Cape Legoupil; and investigations were made with a view to initiating flights from Punta Arenas direct to Paradise Harbour. The eight members of the relief party at that station are reported to have prepared facilities for receiving amphibian aircraft. Up to the present time, nothing further has been heard of this project.

The parties which had wintered at the three stations during 1951 returned to Santiago by air on 29 March 1952.

¹ The positions of these stations are shown in the *Polar Record*, Vol. 8, No. 52, 1956, map p. 61.

Chilean Antarctic Expedition, 1952-53

[Based on *Revista de Marina* (Valparaíso), Vol. 69, No. 574, 1953, p. 334-64; *Revista Andina*, Año 16, No. 78, 1952, p. 30, and Año 17, No. 79, 1953, p. 29.]

In 1952-53 the seventh official Chilean expedition visited the Falkland Islands Dependencies, under the command of Comodoro Alberto Kahn Wiegand.

The ships taking part were the frigate *Iquique*, Capitán de Fragata Víctor Wilson A., the tanker *Maipo*, Capitán de Fragata Ramon Barros G., and the patrol boats *Lientur*, Capitán de Corbeta Luis Mansilla Y., and *Leucotón*, Capitán de Corbeta Rinaldo Roepke R. The *Maipo* carried a "Beaver" monoplane, fitted with floats.

In addition to the relief parties for the three existing stations, the following accompanied the expedition for the summer season:

Mayor Miguel Casals R., representative of the armed forces
Teniente Coronel Humberto Rojas F., representing the army
Capitán de Bandada Carlos Toro Mazote G., representing the air force
Father Marcelo Asenjo G., chaplain.

The ships left Valparaíso in mid-December 1952, and Punta Arenas on 20 December, reaching Discovery Bay on the 25th. The relief and reprovisioning of the station in Discovery Bay was completed by the 31st and the 1953 wintering party of eight naval men was installed.

Meanwhile, the *Lientur* and *Leucotón* had left Discovery Bay in order to relieve the other two stations. Cape Legoupil was reached on 30 December. The reprovisioning was completed by 14 January 1953, and Comodoro Kahn reviewed the work which had been done. The station was manned during 1953 by a party of five or six army men under Capitán Mario Stock.

During December 1952 the Paradise Harbour station was inaccessible due to ice in Gerlache Strait, but with the help of air reconnaissance a way through was eventually found. The relief of this station was completed by 16 January 1953, and a new wintering party of seven air force men was installed.

All those who had been relieved were brought back to Discovery Bay, and sailed for Punta Arenas aboard the *Maipo* on 19 January.

Throughout January the weather was bad. During the early part of the month Comodoro Kahn made a reconnaissance with the *Iquique* of the South Shetland Islands and northern Graham Land as far as ice conditions allowed. Soundings were taken in Admiralty Bay, King George Island, on 6 January, and in Port Foster, Deception Island, on 7-8 January, and a new refuge hut was built on the south side of Yankee Harbour in Greenwich Island. It was not occupied. The "Beaver" was used for air reconnaissance, particularly in the vicinity of Deception Island and Admiralty Bay.

On 18 January the *Iquique*, *Lientur* and *Leucotón* all visited Deception Island, leaving again the same day. The *Leucotón* returned on the 21st, and was joined by the *Lientur* on the 22nd, and the *Iquique* on the 25th. During the next few days work was started on the erection of a small refuge hut, about 500 yards west of the British station in Whalers Bay, and on the south-west side of the landing strip.¹ Capitán de Bandada Toro Mazote made a rough survey of the area, including the disused whaling station and the vicinity of the F.I.D.S. station, with a view to extending the Chilean installations and developing the landing strip in a later season. The hut was temporarily occupied and a tide gauge was operated in Whalers Bay during late January and early February whenever Chilean ships were in Port Foster.

On 4 February, the commander of the Punta Arenas base, Luis Alberto Núñez, with Sargento Gregorio Salas as his co-pilot, flew an American monoplane, fitted

¹ See the *Polar Record*, Vol. 7, No. 48, 1954, photograph facing p. 163.

with additional tanks, over Drake Passage. They flew south until they could see Deception Island, but were then forced by bad weather to return. Their proposed destination has not been published.

On 8 February, the three ships *Iquique*, *Lientur* and *Leucotón* collected in Discovery Bay for the return voyage to Punta Arenas.

On 15 February, a week after the departure of the ships, the new Chilean hut on Deception Island was dismantled by the Falkland Islands civil authorities.¹

During the winter, it appears that scientific work was limited to meteorology. In August 1953, three Chileans from Cape Legoupil visited Hope Bay. They set out on 17 August, were held up by bad weather for five days, and again when their dogs ran away, and eventually reached Hope Bay on 29 August with their dogs, but without the sledge. They stayed at the Argentine station there until 10 September, when they were accompanied back to Cape Legoupil by three Argentines driving their own dog team. No scientific work was undertaken.

Chilean Antarctic Expedition, 1953-54

[Based on *Revista Andina*, Año 18, 1954, No. 80, p. 34.]

In 1953-54 an eighth official Chilean expedition was despatched to the Falkland Islands Dependencies, under the command of Capitán de Navío Alfredo López Costa.

The ships taking part were the frigate *Covadonga*, Capitán de Fragata Raul del Solar Grove, the tanker *Rancagua*, Capitán de Fragata Vicente Reyes, and the patrol boats *Lientur*, Capitán de Corbeta Mario Mutis, and *Lautaro*, Capitán de Corbeta Patricio Carvajal Prado. The *Rancagua* carried a "Beaver" aircraft fitted with floats, and, for the first time, a helicopter.

The *Rancagua*, *Lientur* and *Lautaro* left Valparaiso on 17 December 1953 for Talcahuano. They reached Punta Arenas towards the end of December, and Discovery Bay about 6 January 1954. The *Rancagua* was responsible for the relief of this station, while the two patrol boats relieved and reprovisioned the other two. Discovery Bay was manned during 1954 by eleven men; Cape Legoupil and Paradise Harbour by about thirteen men.²

On 19 January, the *Covadonga* sailed from Punta Arenas for Discovery Bay to take the 1953 wintering parties back to Chile. During her return voyage, on 29 January, she visited Deception Island.

The two patrol boats also visited Deception Island on many occasions between 10 January and 27 February. No attempt was made, however, to re-establish the refuge hut close to the F.I.D.S. station. Some hydrographic work was carried out.

The "Beaver" flew over Deception Island several times during the second half of January, and the helicopter was seen over Admiralty Bay on 16 January.

The ships returned to Punta Arenas on 7 March.

Chilean Antarctic Expedition, 1954-55

[Based on *Revista de Marina* (Santiago), Vol. 71, No. 584, 1955, p. 1.]

In 1954-55, the Chilean Government despatched their ninth expedition to the Falkland Islands Dependencies. This expedition, which was under the command of Capitán de Navío Jorge Gándara Bofil, had as its main objectives the relief of the existing stations, and the establishment of a new one in Pendulum Cove, Deception Island.

¹ For a description of this event and a statement by the Secretary of State for Foreign Affairs in the House of Commons on 23 February 1953, see the *Polar Record*, Vol. 7, No. 48, 1954, p. 169-70, 217.

² The exact numbers and names of the relief parties do not appear to have been published.

The transport *Maipo*, Capitán de Fragata Ramon Pinochet, left Valparaíso on 5 December 1954, carrying one "Beaver" aircraft fitted with floats and one Bell type 47 D helicopter. She was joined by the patrol boat *Leucotón*, Capitán de Corbeta German Valenzuela, at Talcahuano, and by the patrol boat *Lautaro*, Capitán de Corbeta Hernán Prat, at Punta Arenas. These three ships, carrying the twenty-eight men who were to relieve the existing stations, left Punta Arenas for the south on 28 December. They were followed a week later by the frigate *Covadonga*.

It appears that the *Maipo*, *Leucotón* and *Lautaro* each carried the relief parties and stores for one station since, on 4 January 1955, they were reported to be relieving the stations at Discovery Bay, Paradise Harbour and Cape Legoupil respectively. The *Maipo* and the *Lautaro* went to Port Foster, Deception Island, on 7 January, and were joined there by *Covadonga* on 12 January. Among those on board the *Covadonga* was Monseñor Vladimiro Borić, Bishop of Magallanes, said to be the first bishop to visit the Antarctic. The men who had been relieved were transferred to the *Covadonga*, which then sailed for Punta Arenas, arriving on 20 January.

Meanwhile, the *Maipo* had put ashore a construction party in Pendulum Cove, and the work of building the new station began. The *Maipo* remained continuously in Pendulum Cove from 7 to 29 January and from 4 to 25 February. During this period the *Leucotón* carried out almost continuous patrols in the vicinity of Deception Island. The *Lautaro* was at Deception Island on 14–15 and 23–25 January, but she also made several visits to Discovery Bay and Admiralty Bay in January and February.

On 18 February, the *Covadonga* returned to Deception Island bringing National Defence Minister Tobías Barros Ortiz and a number of other officials to open the new station. The inauguration took place at a ceremony on the same day, and the station was named "Presidente Pedro Aguirre Cerda".¹ It is to be controlled by the Chilean Air Force. The *Covadonga*, with the Minister aboard, left Deception Island on 19 February to visit Discovery Bay and Cape Legoupil. She returned to Punta Arenas on 22 February.

The *Lautaro* and *Leucotón* again visited Deception Island on 27–28 February, returning to Punta Arenas early in March. After leaving Deception Island on 25 February, the *Maipo* returned via Laurie Island to Punta Arenas, arriving on 5 March.

Review

In the years 1952–55, the Chilean expeditions not only carried out the annual relief of their three existing stations, but also established a new permanent station on Deception Island, where British and Argentine parties have been in occupation since February 1944 and November 1947 respectively. They also built a new refuge hut in Yankee Harbour, Greenwich Island. The scientific work at the occupied stations appears to have been confined to meteorology. The ships have made limited hydrographic surveys.

BRITISH TRANS-ANTARCTIC EXPEDITION: ADVANCE PARTY, 1955–56

[This preliminary report is summarized from unpublished papers and radio reports.]

In June 1955 the Trans-Antarctic Expedition Ltd. was registered as a company whose aims are "to promote and organize an expedition for the exploration of the Antarctic". The expedition is financed by the governments of the United Kingdom,

¹ President of Chile, December 1938 to November 1941.

New Zealand, Australia, and South Africa and by public subscription, and is under the leadership of Dr V. E. Fuchs. The object is to cross Antarctica in 1957-58 from the Vahsel Bay area, in the Weddell Sea, by way of the South Pole, to McMurdo Sound, in the Ross Sea, a journey of about 1750 miles (2816 km.). At the same time a party of New Zealanders led by Sir Edmund Hillary will move towards the South Pole from McMurdo Sound in order to re-supply the trans-continental one; the two parties expect to meet in the vicinity of Mount Albert Markham and to return together to McMurdo Sound. Mechanical vehicles and dogs are to be used, and air support will be provided for both parties.

The programme of the expedition is spread over three seasons. In 1955-56 an advance party established the main station in the Vahsel Bay area, while a New Zealand contingent reconnoitred the Ferrar Glacier area of McMurdo Sound. In 1956-57 the Vahsel Bay advance party will establish a depot 300 miles (483 km.) south, while the New Zealand party will set up their station in the McMurdo Sound area and establish a route on to the plateau. The trans-Antarctic journey is planned for the summer of 1957-58. Throughout this time scientific investigations, in particular meteorological observations and seismic soundings of the ice sheet along the route, will be carried out.

The advance party left London on 14 November 1955 in the *Theron*, Captain Harald Marø. They were:

K. V. Blaiklock, Leader and surveyor
J. J. la Grange, Meteorologist
R. Goldsmith, Doctor
D. E. L. Homard, Engineer
P. H. Jeffries, Meteorologist

R. A. Lenton, Radio operator and carpenter
R. H. A. Stewart, Meteorologist
Sgt. E. Williams, R.A.F., Radio operator and mechanic

The following members of the main party accompanied them, and returned on the *Theron* early in 1956:

V. E. Fuchs, Leader and geologist
Flight-Lieutenant G. Haslop, R.A.F., Pilot
Squadron-Leader J. Lewis, R.A.F., Pilot
G. Lowe, Photographer

D. L. Pratt, Engineer
D. G. Stratton, Surveyor
Sgt. P. Weston, R.A.F., Air mechanic
D. Williams, Cameraman

At Montevideo, on 10 December 1955, Sir Edmund Hillary, Squadron-Leader Clayton, R.N.Z.A.F., and J. Holmes Miller, surveyor, all of the New Zealand party, joined the *Theron*, for this voyage.

The party left South Georgia on 20 December, and from 27 December 1955 until 25 January 1956 the *Theron* was held in the ice of the Weddell Sea, drifting in a north-westerly direction and unable to break through to open water. During most of this time she was unable to use her Auster aircraft, which was fitted with floats, for reconnaissance, owing to the lack of sufficient water from which it could operate. On 15 January an offer was made by H.M.S. *Protector*, which was operating off west Graham Land, to bring helicopters for an ice reconnaissance. This was accepted. Meanwhile, the *Theron* had slowly been approaching more open water and, with the aid of a helicopter, eventually escaped from the ice and met the *Protector* in lat. 66° 20' S., long. 31° 50' W. The *Theron* then proceeded towards Vahsel Bay, reaching the Royal Society Expedition's station at Halley Bay on 27 January. Several reconnaissance flights were made from there. These showed that the way inland was barred by heavily crevassed ice streams, and that it would not be possible for the Trans-Antarctic Expedition to share this base as had been hoped. The *Theron* sailed on for some 200 nautical miles, to reach Vahsel Bay and the Filchner Ice Shelf, where further reconnaissance flights were made. During these flights two or three points were selected where the compacted snowdrifts on the fast ice had formed ramps against the ice front and so provided means of reaching the surface

of the ice shelf. Further flights disclosed what appeared to be a practical route for vehicles to penetrate inland. On 30 January a suitable site for the station, named "Shackleton", was selected and unloading began. The *Theron* lay alongside unbroken bay ice 12 ft. thick. The floats of the aircraft were replaced by skis and a runway, about 800 yd. (730 m.) long, was prepared on the bay ice near the ship.

On 1 February a northerly blizzard began; and unloading could only be continued with extreme difficulty. The condition of the sea ice soon became dangerous and the *Theron* was fortunate to escape. She had to leave on 7 February, after unloading had been completed, and even then she was held fast for several hours when only two miles from "Shackleton". The following day a call was made at Halley Bay and by the 10th the *Theron* was clear of the ice and bound for Grytviken. The ship finally reached London on 23 March.

Meanwhile, three New Zealanders, Trevor Hatherton, leader and geophysicist, Bernard Gunn, geologist, and Lt.-Cdr. William J. L. Smith, R.N.Z.N., had accompanied the United States "Operation Deepfreeze 1" to McMurdo Sound. There they spent two months, examining the area for possible sites for the New Zealand party's base, and for routes on to the inland plateau. They returned to New Zealand on 17 February in the icebreaker *Glacier*. A site will be chosen for the New Zealand parties for both the Trans-Antarctic Expedition¹ and the International Geophysical Year when their recommendations have been studied.

¹ See p. 183.

NOTES

DETERMINATION OF AGE OF THE LARGER
WHALES (*MYSTICETI*)

[Note by R. M. Laws, National Institute of Oceanography, based on a paper by P. E. Purves in *Discovery Reports*, Vol. 27, 1955, pp. 293-302.]

Biologists have long been seeking a reliable and accurate method of determining the age of whales. The most promising existing methods, namely the incremental ridges in the baleen plates and the number of corpora albicantia in the ovaries, have serious limitations. The use of baleen ridges is restricted to the first few years of life owing to wear, and corpora albicantia can be used only for mature females.

A new and very promising method depends on the occurrence in the Mysticeti of laminations in the wax plug which fills the proximal part of the external auditory meatus from the tympanic annulus to a lateral constriction immediately below the blubber layer. No such structure is found in the Odontoceti. Biochemical analysis shows that the plug is largely composed of solids and is not homologous with human ear wax. Structurally the plug is differentiated into two parts: the outer covering, which forms the whole of the attenuated distal part, is the stratum corneum of the epidermis of the meatus, and the core, which comprises the greater part of the conical basal portion of the plug, is derived from the "glove finger" in the tympanic annulus.

In a core bisected longitudinally a number of conspicuous concentric laminations are visible on the cut surface as alternate light and dark coloured bands, which represent an alternating histological structure. The "glove finger" remains constant in size throughout life and the diameter of the bony external meatus does not increase. The great lateral growth of the skull of the Mysticeti is apparently the result of lateral extension of the bones concerned in the formation of the external auditory meatus. During this lateral growth the wax plug would tend to be drawn away from its contact with the "glove finger", the space so formed being simultaneously filled with squamous epithelium from the "glove finger".

The laminations are the result of discontinuous growth, possibly related to the annual feeding and migration cycle, and the thin dark-coloured layers represent periods of reduced lateral extension of the skull. It appears that lateral growth of the skull can continue throughout life. As a result of a recent visit to the whaling station at Steinshamn, Norway, P. E. Purves and R. M. Laws have been able to correlate the numbers of laminations in the wax plug of Fin Whales (*Balanus physalus*) with body length, fusion of the vertebral epiphyses, and numbers of corpora albicantia. The analogy with the growth zones in mammalian teeth, fish scales and otoliths, etc., is obvious. Employing the wax plug it should be possible to determine individual ages with accuracy, although it still remains to determine for each species the rate at which the laminations are deposited.

THE PHYSIOLOGY OF SURVIVAL IN COLD WATER

[By Dr L. G. C. E. PUGH and Dr O. G. EDHOLM, National Institute for Medical Research, Division of Human Physiology.]

Observations have been made on the effect on body temperature of swimming and lying still in cold water. Both long-distance swimmers and controls have been studied. Even in water as warm as $15-16^{\circ}\text{C}$., average survival time is only 5-6 hours. This statement is based on the records of survivors from ships lost during the Second World War. Channel swimmers, on the other hand, spend 12-20 hours swimming in water at such a temperature. It was hoped that studies on the swimmers would reveal the reasons for their ability to survive for so long, and in particular answers were sought to the following questions:

- (1) How long do long-distance swimmers maintain their heat balance?
- (2) Is their heat production exceptionally high?
- (3) Is heat lost less rapidly because of increased insulation?
- (4) Do they tolerate hypothermia better than the average individual?

The conclusions reached are that all Channel swimmers examined so far are fat, many grossly so. The insulation of this thick subcutaneous layer of fat is considerable. Experiments on fat individuals who are not long-distance swimmers show that they cool less rapidly in cold water than thin individuals. The energy expenditure of Channel swimmers is not exceptionally high with regard to the number of calories produced per minute, but they are remarkable in that they can maintain a moderately high level of energy expenditure for a long time.

Some of the swimmers examined immediately after the cross-Channel race had very low rectal temperatures; an unsettled problem is how they manage to continue swimming at such low body temperatures.

These observations throw some light on the vexed problem of the advice to be given to those who may be immersed in cold water, i.e. should they swim or struggle hard, or should they try to preserve their strength by clinging to wreckage, or floating in life jackets? The fat long-distance swimmers maintained their rectal temperatures for many hours both swimming and lying still in cold water. Thin individuals had a more rapid drop in body temperature when they were swimming than when they kept still. Traditional naval advice to cling to wreckage in order to conserve strength would appear, therefore, to be sound.

THE LOCATION OF THULE, GREENLAND

Changes in the location of Thule are likely to cause confusion until the anomalous situation now existing there is settled.

During the Second World War the United States built an air base at the Eskimo settlement of Thule (lat. $76^{\circ}34' \text{N}$., long. $68^{\circ}49' \text{W}$.). In 1953 the Eskimo moved away and formed a new settlement at Kanaq, in Inglefield Bredning (lat. $77^{\circ}27' \text{N}$., long. $69^{\circ}11' \text{W}$.), and a Danish International

Geophysical Year station is planned there. The official Danish name for Kanaq was changed to Thule, and of the old Thule to Dundas Radio. The Americans however, continue to refer to the air base as Thule.

In order to minimize the confusion the Comité Spécial de l'Année Géophysique Internationale refer to the U.S. air base as *Thule air base* and the Eskimo settlement as *Thule village* in the list of stations for the International Geophysical Year.

THE SOVIET ARCTIC IN THE SIXTH FIVE-YEAR PLAN, 1956-60

[From *Pravda*, 15 January and 26 February 1956.]

The Twentieth Congress of the Communist Party of the Soviet Union, held in Moscow in February 1956, approved the sixth Five-Year Plan covering the period 1956-60. The Plan contains the following direct references to arctic undertakings.

“To build an atomic-powered icebreaker.

To increase prospecting for new fields of coking coal in the...Pechora... and south Yakutiya basins.

To double-track 6600 kilometres of railway, including the lines:...Konosha-Kotlas-Vorkuta, ...Apatity-Sorokskaya.

To secure the further development of the Northern Sea Route.

To secure the reconstruction and development of sea ports, especially... Petropavlovsk-Kamchatskiy, ...Murmansk; to further construction of the new Ozernovskiy Port on the west coast of Kamchatka.

To carry out preparatory work for establishing a diamond-mining industry in Yakutskaya A.S.S.R.”

The particular railway lines and ports specified in the third and fifth paragraphs were mentioned in the draft plan, but were omitted, together with the other place-names in these sections, in the final version approved by the Congress.

BRITISH ARCTIC AIR ROUTES

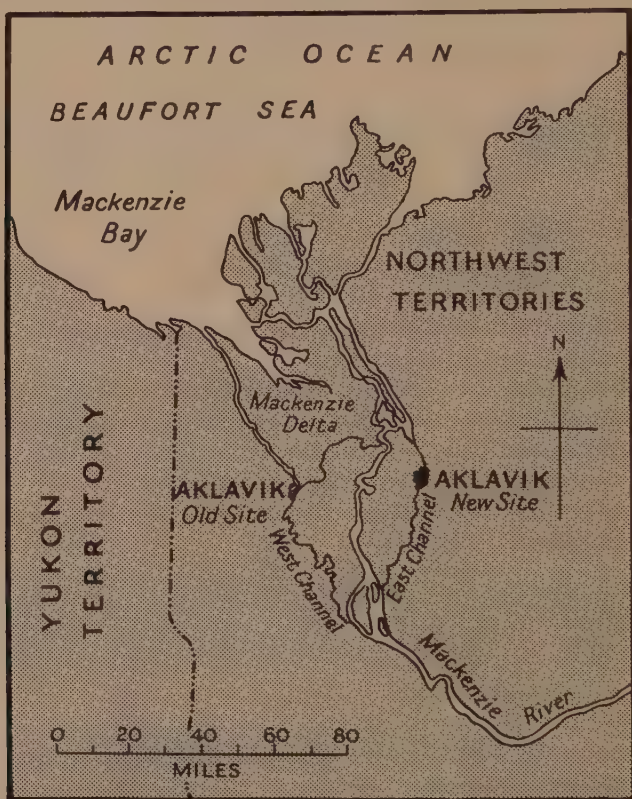
[Summarized from *The Times*, 2 March 1956.]

In May 1955 Anglo-American discussions were opened in Washington on a new bilateral civil air transport agreement. The talks could not be completed before the United Kingdom delegation had to leave to attend a conference in Montreal, but agreement had then been reached on reciprocal authorization for trans-arctic routes between London and the west coast of the United States. The talks are being resumed in London but no details of the proposed route are yet available. British Overseas Airways Corporation plan to open two round-the-world routes, when they have suitable aircraft, one of which will include a trans-arctic service.

TRANSFER OF AKLAVIK, NORTHWEST TERRITORIES TO NEW SITE

[Summarized from an article by R. Gordon Robertson in the *Canadian Geographical Journal*, Vol. 50, No. 6, 1955, p. 196-205.]

Aklavik is the farthest north settlement of importance in the Canadian Arctic; it lies on the West Channel of the Mackenzie River delta, 60 miles from the Beaufort Sea, and is, therefore, the terminus of the long waterway connecting the arctic coast with the centre of Canada.



The old and new sites of Aklavik.

The Hudson's Bay Company post, established in 1912 for the muskrat trade, has developed into a township comprising government departments, schools, hospitals and a permanent population of some 500, rising to 1500 during the summer trading season. It is already an important centre, and will become increasingly more important as the delta area develops; unfortunately, like many townships with a similar history, it has grown up on a site which precludes its own satisfactory development. The ground on which it is built is permanently frozen to a depth of about 1000 ft., with the top 18 in. the "active

layer", melting and freezing each year. There is no significant ground slope and, as the permafrost prevents any subsoil drainage, the construction of roads is impossible. The permafrost also determines the type and efficiency of the buildings erected. The soil is composed of fine silts, with a very high water content, and this prevents the installation of water and sewer mains at an economical cost. The lakes and marshes which crowd the site on to a small area near the river bank leave no room for expansion or for the construction of a convenient air field. Finally the river is not only liable to flood during "break-up", but is steadily eroding away its banks.

In 1953, therefore, it was decided to move Aklavik to a more suitable site, and the Department of Northern Affairs and Natural Resources sent site-survey teams to explore the area. The factors by which the suitability of potential sites was judged were as follows:

Essential factors

- (a) Suitability from economic and social points of view.
- (b) Suitability of ground for permanent sewer and water systems, foundations and permanent roads.
- (c) Access to a good river channel.
- (d) Availability of a suitable site for an airfield.

Highly desirable factors

- (a) Satisfactory means of sewerage disposal.
- (b) Availability of gravel and sand for building materials.
- (c) Possibilities as a trans-shipment point from river to sea-going vessels.

Desirable factors

Availability of (a) wood, (b) coal and (c) a hydro-electric power site.

The survey teams examined five possible sites between March and August 1954 and finally chose one on the East Channel of the delta which satisfied both the essential and the highly desirable qualifications demanded. This site, 33 miles by land and 70 miles by water from the present township, was approved by the Canadian government in November 1954.

The move of Aklavik is seen as a five-year project with the selection of the new site as the first year's object. In 1955 work began on the airstrip, roads, wharf and warehouses; in 1956 streets, water and sewerage systems are to be put in; and in 1957 and 1958 permanent buildings are to be erected and others transferred from the old site.

LOSS OF THE *JOPETER* IN THE GREENLAND SEA

[Summarized from a copy of the deck-log of the *Jopeter*, supplied by R. N. Salvesen.]

The *Jopeter*, belonging to Peter S. Brandal and Company A/S and on charter to den kongelige grønlandske Handel, left Danmarks Havn, east Greenland, on 26 August with 19 passengers and 26 crew.

For the next five days she struggled to break through the pack ice up and

down the coast with no success and, on 1 September, she finally became beset nine nautical miles east of Store Koldewey in lat. $76^{\circ} 30' N.$, long. $18^{\circ} 10' W.$ The following day a floe heeled the ship over until she lay with a list of about 30° , some damage was done to the main hatch by the deck buckling, and it was considered advisable to lower a lifeboat with emergency supplies. Later, however, the pressure of the ice lessened and the ship was able to right herself, so the lifeboat was hoisted aboard again. On 3 September a U.S. aircraft dropped supplies which were collected, and on the 4th a Danish "Catalina" and another U.S. aircraft attempted to guide her out of the then broken ice, but she very soon became beset again. Early next morning, when she was in lat. $76^{\circ} 18' N.$, long. $17^{\circ} 42' W.$, her propellor was broken off by an ice floe. The owners and other interested parties were informed and, in consequence, three ships, the *Tottan*, the *Kista Dan* and the *Andenes*, were directed towards the now helpless *Jopeter*. On the 7th radio contact was established with the *Tottan* lying outside the pack ice and on the 8th passengers and some crew were carried to her by a land-based helicopter. Two days later the *Kista Dan* came in sight and eventually forced her way alongside ready to haul the *Jopeter* free when ice conditions permitted. By 13 September, however, it became apparent that this was unlikely to happen and at one time the *Kista Dan* herself became beset. The remaining crew of the *Jopeter* transferred to her, followed next day by the captain, and they were all finally embarked on the *Andenes* later in the day. The *Jopeter* was then abandoned, and, soon afterwards, sank.

BRITISH FISHERIES RESEARCH VESSEL *EXPLORER*

[Summarized from information provided by Messrs Alexander Hall and Co.]

The *Explorer* was built for the Scottish Home Department by Messrs Alexander Hall and Co. at Aberdeen, and was launched in June 1955.

The vessel has an overall length of 202 ft., a beam of 32 ft., and a depth of 16 ft.; she carries about 450 tons deadweight on a mean draft of 14 ft. There is a triple expansion steam engine developing 1000 i.h.p. and giving a speed of 12 knots, with a range of about 8700 miles. The hull is specially thickened for work in ice. The bridge deckhouse and the sailing and motor lifeboats are made entirely of aluminium.

There is accommodation for 38 persons, with three laboratories and two insulated fish rooms for the use of scientists.

ROYAL RESEARCH SHIP *SHACKLETON*

[Summarized from information provided by the Colonial Office.]

This vessel was built at Solvesborg, Sweden, in 1954 for the Arendals Dampskibsselskab of Norway. At the end of August 1955 she was purchased for the Falkland Islands Dependencies Survey and named *Shackleton* at a ceremony performed at Southampton on 19 December 1955 by Mrs Arthur, wife of the governor of the Falkland Islands and their Dependencies.



R.R.S. Shackleton



Ernest Holt in Tromsö (see p. 109)

*Photograph by David Vaux
(Facing p. 180)*



U.S.S. Glacier

The *Shackleton* has an overall length of 200 ft. with a beam of 36 ft. The registered tonnage is 1102 gross and 274 net. Her deadweight capacity is approximately 1000 tons on a draft of 14 ft. There is a single screw driven by a 6-cylinder MAN diesel engine developing 785 b.h.p. at 275 r.p.m., giving a trial speed of 11.5 knots, and she is fitted with a Kamena reversible pitch propeller. She has a range of 15,000 miles and a cargo capacity of 35,350 cu.ft., or approximately 700 tons.

Although specially built for ice work along the Norwegian coast, she has been further strengthened and a number of other modifications made. The most important of these is the extension of the forward part of the superstructure, including the wheelhouse, for 32 ft., in order to provide accommodation for 32 members of the Falkland Islands Dependencies Survey in addition to the normal crew of 30. Horizontal fins have been constructed forward of the propeller to give added protection from ice. A larger oil-fired boiler for heating the ship has been installed, also a cargo crane, capable of lifting 5 tons, which travels fore and aft on rails placed on the hatch coamings.

The *Shackleton* is commanded by Captain W. Johnston, the senior Falkland Islands Dependencies Survey master and, until this season, master of the Royal Research Ship *John Biscoe*.

THE U.S. NAVY ICEBREAKER *GLACIER*

[Information provided by the Ingalls Shipbuilding Corporation and the *Bureau of Ships Journal*, Vol. 3, No. 4, 1954. p. 48.]

The U.S.S. *Glacier* was built for the United States Navy by the Ingalls Shipbuilding Corporation, and launched in August 1955. She is the largest and most powerful icebreaker to be built in America and is regarded as the prototype of future icebreaker construction.

Details of the vessel are: length 310 ft., beam 74 ft., moulded draft 38 ft., and displacement 8,300 tons. Power is provided by two 10,500 h.p. electric motors, each 15 ft. in diameter and weighing 108 tons; power for these is supplied by ten generators driven by diesel engines. Two helicopters are carried.

In November 1955 the *Glacier* joined the U.S. Navy Task Force 43 to take part in "Operation Deepfreeze I" in Antarctica.

RENEWAL OF TRIPARTITE ANTARCTIC NAVAL DECLARATIONS FOR SEASON 1955-56

[Previous declarations were recorded in the *Polar Record*, Vol. 5, Nos. 37/38, 1949, p. 361; No. 40, 1950, p. 635-36; Vol. 6, No. 42, 1951, p. 277-78; No. 44, 1952, p. 549; No. 46, 1953, p. 838; Vol. 7, No. 48, 1954, p. 226, and No. 50, 1955, p. 425.]

Since January 1949 the United Kingdom, Argentina and Chile have annually informed each other that, apart from customary movements, they could foresee no need to send warships south of lat. 60° S. The object has been to avoid friction in Antarctica between the three powers. These declarations were renewed for the 1955-56 summer season on 21 November 1955.

INTERNATIONAL GEOPHYSICAL YEAR, 1957-58:
ANTARCTICA 1955-56

[In the last number of the *Polar Record* there appeared a note on the various scientific studies that are to be the object of the International Geophysical Year, 1957-58; the following notes outline the plans of the nations which are carrying out these investigations in the Antarctic, and sub-Antarctic. Brief accounts, based on radio reports received up to 31 March, are also given of the advance parties that have already arrived.]

Eleven nations intend to operate stations in the Antarctic and sub-Antarctic during the International Geophysical Year: Argentina, Australia, Chile, France, Japan, New Zealand, Norway, South Africa, the United Kingdom, the United States and the U.S.S.R. Of these, only four had permanent stations in Antarctica at the end of the 1954-55 season (Argentina, Australia, Chile and the United Kingdom), though all, with the exception of New Zealand and South Africa, have sent expeditions there. The scope of each nation's activities varies, as does the size of the expeditions and the number of seasons which are to be spent in the field, but the concentration of effort during the next three years will be very much greater than at any time in the past. Not all the stations are to be specially established for the International Geophysical Year; many existing ones are being enlarged and adapted, while others will be merely sub-stations visited occasionally to check readings of automatic instruments. Nevertheless, during the summer of 1957-58, it is expected that more than forty stations will be manned in Antarctica and the sub-Antarctic islands. The following is a brief review of the plans and activities of each nation.

Argentina

No new stations are being planned, but eight existing ones are to be enlarged and re-equipped: Laurie Island in the South Orkney Islands, Half Moon Island and Deception Island in the South Shetland Islands, Hope Bay in Trinity Peninsula, Gamma Island in the Palmer Archipelago, Paradise Harbour on the Danco Coast, Barry Island on the Fallières Coast, all in Graham Land, and "Base General Belgrano" on the Filchner Ice Shelf (lat. $77^{\circ} 59' S.$, long. $38^{\circ} 44' W.$).

Australia

The Australian programme is being organized by the Australian National Antarctic Research Expedition (A.N.A.R.E.) and will be centred on two existing stations, Macquarie Island and Mawson, and a new station to be set up in 1956-57 in the Vestfold Hills area of Princess Elizabeth Land. It is expected that this station will be situated about 400 miles (650 km.) east of Mawson, in about lat. $69^{\circ} S.$, long. $78^{\circ} E.$

Chile

Chile, too, is to adapt her existing stations at Greenwich Island and Deception Island in the South Shetland Islands, Cape Legoupil in Trinity Peninsula and Paradise Harbour on the Danco Coast of Graham Land.

France

France proposes to have two new stations in Terre Adélie and to adapt the programme of research at the existing station at Port-aux-Français, Îles de Kerguelen. One of the new stations was established on the coast of Terre Adélie in 1955-56 and the other is to be in the vicinity of the South Magnetic Pole.

The advance party left Rouen on 8 October 1955 in the *Norsel*, a Norwegian vessel. Paul-Émile Victor, leader of the summer party, joined the ship in Australia. The *Norsel* left Hobart on 26 December and arrived at Pointe Géologie in Terre Adélie on 2 January 1956. A site for the station was chosen on the highest point of Ile des Péterls (lat. $66^{\circ} 40' S.$, long. $140^{\circ} 01' E.$), and the unloading of 350 tons of material and stores was carried out in good weather in ten days. The wintering party, under Robert Guillard, is to construct the second Terre Adélie station in the vicinity of the South Magnetic Pole in October 1956.

The 1956 wintering party consists of:

R. Guillard, Leader	L. Faivre, Mechanic
M. Grisoni, Second-in-Command, surveyor	L. Laroque, Meteorologist
G. Bazile, Medical officer	J. Prévost, Ornithologist
G. Couly, Mechanic	J. Quinquet, Engineer
P. Dill, Meteorologist	M. Sebbah, Radio operator
G. Duffaud, Cook	P. de Souza, Radio technician
M. Evanno, Mechanic	R. Thurieau, Radio operator

The main party, under Bertrand Imbert, the overall leader of the expedition, is expected to occupy the Terre Adélie stations early in 1957. They will be relieved by a third party, under François Tabuteau, which will winter in 1958. *Norsel* left Terre Adélie on 26 January with Victor, Imbert and Tabuteau, who had accompanied the party to study local conditions, and J. Martin, who had gone to make gravimetric and oceanographical observations.

Japan

An expedition is planned for 1956-57 to establish a station on Prins Harald Kyst in Dronning Maud Land. Professor Takeshi Nagata of Tokyo University is to lead it. The vessel to be used is a lighthouse supply ship, the *Soya*, which is being converted and strengthened. The captain of the *Soya*, Mitsuji Matsumoto, together with the chief engineer, Tatsuo Shigematsu, and Junichi Yamamoto, the navigator, accompanied the Japanese whaling fleet to the Southern Ocean during 1955-56 to search for a possible site for the proposed station.

New Zealand

New Zealand intends to adapt the research programme at her existing station on Campbell Island (lat. $52^{\circ} 32' S.$, long. $169^{\circ} 09' E.$), and to establish a new one in McMurdo Sound. The McMurdo Sound station will also be used by the New Zealand party of the Trans-Antarctic Expedition. Trevor Hatherton, with B. Gunn and Lt.-Cdr. W. J. L. Smith, accompanied the U.S.

"Operation Deepfreeze I" to the area in December 1955, and made a reconnaissance of the McMurdo Sound area. A site for the International Geophysical Year station will be chosen when their recommendations have been studied. The station will be constructed in 1956-57.

Norway

A station is to be set up in 1956-57 in Kronprinsesse Märtha Kyst in Dronning Maud Land (about lat. $70^{\circ} 30' S.$, long. $0^{\circ} W.$). It is expected that about fourteen men will form the wintering party. The ship to be used is the Norwegian *Polarsirkel*.

South Africa

Existing stations in the sub-Antarctic islands of Tristan da Cunha and Marion Island will be adapted, and a new station operated on Gough Island. An expedition from England, the Gough Island Scientific Survey, has been working on this island since November 1955, and the South African Government plan to take over and enlarge the meteorological station which it has established.

United Kingdom

The Royal Society is planning to adapt the research programme at a number of the existing British stations in the Falkland Islands and their Dependencies to meet the requirements of the International Geophysical Year programme.

These stations will be Stanley in the Falkland Islands, Grytviken in South Georgia, Signy Island in the South Orkney Islands, Admiralty Bay in the South Shetland Islands, Hope Bay in Trinity Peninsula, Port Lockroy in the Palmer Archipelago, the Argentine Islands and Horseshoe Island off west Graham Land. A new station was also established in Coats Land by the Royal Society.

The advance party of the Royal Society Antarctic Expedition sailed from Southampton on 22 November 1955 in the Norwegian ship *Tottan*, Captain L. Jakobsen.

The 1956 wintering party consists of:

Surgeon Lieutenant-Commander David
Dalglish, R.N., Leader
R. Dalglish, Tractor driver
Stanley Evans, Physicist
C. P. Le Feuvre, Radio operator
D. W. S. Limbert, Meteorologist
George Lush, Tractor driver

K. E. C. Powell, Mechanic
D. Prior, Carpenter
J. E. Raymond, Carpenter
Major G. E. Watson, R.E.M.E.,
Electronic engineer

The Expedition's stores officer George Hemmen accompanied the party for the summer season.

The *Tottan* reached Grytviken on 25 December and left the next day with the object of penetrating as far as possible into the Weddell Sea. On 1 January 1956, after an easy passage through fairly clear water, she reached Kapp Norvegia in Dronning Maud Land. She then continued south-westwards along the coast of Coats Land. A site for the station was finally chosen on 6 January

in lat. $75^{\circ} 36' S.$, long. $26^{\circ} 41' W.$, and named Halley Bay. No rock is visible in the area, but the station is believed to be on an ice piedmont or on grounded ice shelf. Eastwards the ice sheet rises gradually inland for about 35 miles. The station is 2 miles (3.2 km.) from the sea. Unloading was made difficult by unusually hot weather, but was completed by 22 January. The *Tottan* reached Grytviken again on the 29th.

United States

The U.S.A. intend to establish seven stations in Antarctica: three of these will be full-scale International Geophysical Year observing stations, at "Little America 5", "Byrd Station" in Marie Byrd Land, and the South Geographical Pole Station. One, at the foot of the Beardmore Glacier, will be a sub-station primarily for logistic purposes; and three will be operational support bases: at Ross Island, in the Vahsel Bay area of Coats Land, and on the Knox Coast.

The advance party known as "Operation Deepfreeze I", under the command of Rear-Admiral Richard E. Byrd, was transported by "Task Force 43" of the United States Navy. The transport unit, commanded by Rear-Admiral George J. Dufek, consisted of seven ships: the icebreakers *Eastwind*, *Edisto* and *Glacier*, the cargo vessels *Arneb*, *Greenville Victory* and *Wyandot*, and the tanker *Nespelen*. The *Glacier* also towed a harbour oiler carrying 220,000 gallons of aviation fuel, and this is to be frozen in near the air-base on Ross Island. The task force left the United States at the end of October 1955, and after calling at Lyttelton, New Zealand, reached the southern part of the Ross Sea in mid-December. The *Glacier* was the first to reach McMurdo Sound, and by 17 December an air-strip had been marked out on the sea ice near Hut Point, Ross Island. Three days later four aircraft, two "Neptunes" and two "Skymasters", flew from Tajiari airfield in New Zealand, a non-stop flight of 2300 miles (3700 km.). Two "Dakotas" and two "Albatross" amphibian aircraft which also attempted the flight were forced to turn back because of head winds. They were later transported to the Antarctic by sea, together with four de Havilland "Otters" and seven helicopters. This air-strip was used until the middle of January 1956, when warm weather affected the surface. The heavy aircraft had to return to Christchurch on 18 January. During the month, however, a number of long-distance flights was made to various points on the continent. They included what is certainly the longest non-stop Antarctic flight yet made, from McMurdo Sound towards the Weddell Sea and back, a total distance of some 3900 miles (6279 km.) covered in $19\frac{1}{2}$ hours. A proper appreciation of these flights must await details, which will not be available until later in the year.

The site for "Little America 5" was chosen on 29 December 1955 some 4 miles south of Kainan Bay and 30 miles east of "Little America 4".

Unloading at "Little America 5" and Ross Island went on throughout January. Rear-Admiral Byrd left on the *Arneb* on 3 February; other ships left when unloaded. The *Glacier* returned to Lyttelton to tow an oil barge containing 276,000 gallons of fuel to McMurdo Sound and left again on 20 February. On 12 March *Eastwind* and *Glacier*, the last two ships of "Task

Force 43" in Antarctica, left McMurdo Sound. *Eastwind*, with a damaged port shaft, made for Wellington. *Glacier* sailed west. Brief landings were made on Prinsesse Ragnhild Kyst and Prinsesse Astrid Kyst, and "Atka Bay" (in lat. $70^{\circ} 34' S.$, long. $08^{\circ} 06' W.$), Kronprinsesse Märtha Kyst was reached on 31 March. It was then too late in the season to search for a base site in the Weddell Sea, as had been planned, so *Glacier* began her homeward voyage.

In mid-January a party of seven men with three tracked vehicles, and supported by a single-engined "Otter" aircraft, set out for Marie Byrd Land to select a site for "Byrd Station" and to mark the route to be used in October 1956 when it is planned to establish this station. The vehicles broke down in the Rockefeller Plateau area, and some of the party were being flown back to base when the aircraft was forced to land, and the party was missing for a week. The aircraft was eventually found in King Edward VII Land, with its occupants unhurt.

A wintering party of seventy-six men are to remain at "Little America 5", and ninety men are remaining at Hut Point.

U.S.S.R.

Three stations are planned by the Academy of Sciences of the U.S.S.R. [Akademiya Nauk SSSR]. These are to be in the Australian Antarctic Territory, one on the coast, and two inland. The first, called "Mirny" after one of Bellingshausen's ships, was established in mid-January 1956 in lat. $66^{\circ} 37' S.$, long. $92^{\circ} 57' E.$, on the mainland opposite Haswell Island. The second, to be called "Vostok" after another of Bellingshausen's ships, will be established by air from "Mirny" and will be near the South Geomagnetic Pole in about lat. $78^{\circ} S.$, long. $102^{\circ} E.$ The third, also to be established by air, is to be called "Sovetskaya" and will be near the "pole of relative inaccessibility" in about lat. $82^{\circ} S.$, long. $55^{\circ} E.$

The advance expedition is led by M. M. Somov, and left Kaliningrad on 30 November 1955 in the ice-strengthened ship *Ob'*, master I. A. Man. Her sister ship the *Lena*, master A. I. Vetrov, followed on 15 December and refrigerator ship No. 7, master M. A. Tsygonkov, left from Riga on the 14th. They carried between them 8000 metric tons of stores, and a number of aircraft. These included one IL-12 and two LI-2 twin engine machines, one AN-2 single engine machine and two helicopters. It is hoped that long range aircraft will fly in later from Australia. Among the personnel of the expedition are some leading soviet scientists: P. V. Ushakov and A. P. Andriyashev, biologists, A. M. Gusev, physicist, K. K. Markov, geographer, P. A. Shumskiy and G. A. Avsyuk, glaciologists, G. M. Tauber, meteorologist, and O. S. Vyalov and M. Klenova, geologists. The flying detachment is in the charge of I. I. Cherevichnyy, with V. I. Akuratov as chief navigator.

The *Ob'*, with Somov aboard, reached the western end of the Shackleton Ice Shelf on 4 January 1956, and air reconnaissance for a suitable base was started at once. On 11 January unloading began at "Mirny". The *Lena* arrived on 20 January and the refrigerator ship on 7 February. During un-

loading the weather was frequently bad, tractor trails from the ships to the base were put out of order and the ships had to change anchorage several times. Between 30 January and 1 February the *Kista Dan*, carrying the Australian relief party for Mawson, called at the station.

The refrigerator ship left to join the whaling fleet on 20 February. The *Ob'* left "Mirnyy" on 1 March to carry out a programme of oceanographical work in the Southern Ocean under V. G. Kort, the deputy leader of the expedition. The *Lena* left on 17 March and reached Adelaide on the 28th.

A number of flights were made from "Mirnyy", including one to the ice-free area in Knox Coast first seen by an aircraft from "Operation High Jump" in 1947, one to the region of the South Geomagnetic Pole, and one to lat. 76° S., long. 79° E.

OBITUARY

A. HARRY BLISSETT died in Christchurch, New Zealand, on 14 August 1955, aged 77. As a private in the Royal Marines he volunteered for service in the British National Antarctic (*Discovery*) Expedition, 1901-04, during which he took part in a number of sledge journeys. In later years he worked in the New Zealand prison service.

FREDERICK J. HOOPER died in Southport on 20 June 1955 at the age of 64. He joined the British Antarctic (*Terra Nova*) Expedition, 1910-13, as a steward, but was transferred to the shore party and proved a valuable member of the expedition. He was a member of the search party that discovered the bodies of Scott, Wilson and Bowers on 12 November 1912, and, in December of the same year, was one of the party that climbed Mount Erebus.

RECENT POLAR LITERATURE

This selected bibliography has been prepared by R. J. Adie, Terence Armstrong, T. H. Ellison, Amorey Gethin, J. W. Glen, W. B. Harland, H. G. R. King, Brian Roberts and Ann Savours. Its main field is the polar regions, but it also includes other related subjects such as "applied" glaciology (e.g. snow ploughs and ice engineering). For the literature on the scientific study of snow and ice and of their effects on the earth, readers should consult the bibliographies in each issue of the *Journal of Glaciology*. For Russian material, the system of transliteration used is that agreed by the U.S. Board on Geographic Names and the Permanent Committee on Geographical Names for British Official Use in 1947 (see *Polar Record*, Vol. 6, No. 44, 1952, p. 546).

Reprints of "Recent Polar Literature", from Nos. 37/38 onwards, can be obtained separately (to allow references to be cut out for pasting on index cards) from the Institute, price 2s. 6d. for two reprints. Copies will be sent without charge to organizations with which the Institute maintains exchange arrangements and which notify their wish to receive them. Readers can greatly assist by sending copies of their publications to the library of the Institute.

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- [WHALING INDUSTRY. JAPANESE.] Den japanske hvalfangstindustri. *Norsk Hvalfangst-Tidende*, Årg. 43, Nr. 11, 1954, p. 625-31, illus. [Extract from Japanese Ministry of Fisheries survey of Japanese whaling industry. In Norwegian and English.]
- [WHALING INDUSTRY. PRODUCTS.] Produksjon av biprodukter. *Norsk Hvalfangst-Tidende*, Årg. 43, Nr. 1, 1954, p. 25-27. [Statistics of production of by-products of whaling industry, 1946-52. In Norwegian and English.]
- [WHALING LAWS. NORWEGIAN.] Den norske hvallovs reglement. *Norsk Hvalfangst-Tidende*, Årg. 44, Nr. 3, 1955, p. 145-46. [Alterations to Norwegian whaling laws resulting from amendments adopted by 1954 meeting of International Whaling Commission. In Norwegian and English.]
- [WHALING SHIPS.] Vriibar propeller for hvalbåter. *Norsk Hvalfangst-Tidende*, Årg. 44, Nr. 9, 1955, p. 530-34, 537-38, 541, illus. [Technical details of variable pitch propellers supplied to whale catching boats by firm A. M. Liaaen since 1952. In Norwegian and English.]

ERRATA

The *Polar Record*, No. 48, July 1954

Page 227, line 11 (third column). *For 5 men read 4 men.*

The *Polar Record*, No. 52, January 1956

Page 39. *Above 1 Beaumont Island insert Supplement. Lincoln Sea.*

Page 57, line 12 (third column). *For 5 men read 4 men.*

TWENTY-NINTH ANNUAL REPORT OF THE COMMITTEE OF MANAGEMENT OF THE SCOTT POLAR RESEARCH INSTITUTE

21 October 1955

The Committee of Management of the Scott Polar Research Institute beg leave to report to the University on the work of the Institute for the year ending 21 July 1955:

The constitutional status of the Institute, and the route for its grant-in-aid, have been and are under review. Completion of this matter may be expected during the coming year.

Information, Advice and Research. The trends noted last year increase in intensity in this period of accelerating activity by many nations in both the Arctic and the Antarctic. As we reported two years ago "it is therefore necessary to emphasize the need for increases, in staff, space and finances".

Particularly noteworthy is the completion by Dr T. E. Armstrong, Research Fellow, of a report for the Canadian Defence Research Board on sea-ice recording and reporting methods. He collected material for the report while on board H.M.C.S. *Labrador* during her voyage through the North-West Passage in the summer of 1954, and later visited institutions in Canada and the United States engaged in ice studies. Ice probability analysis, based on a digest of all past reports, is of particular importance in these days in the Russian Arctic, the Canadian Arctic and the Antarctic, and the Institute affords an appropriate centre for these studies which are of such immediate importance to shipping.

Staff. There have been many staff changes during the past year.

It was with great regret that the resignations of Mr Douglas Blyth, Miss June Blomfield and Miss Margaret Butterworth were accepted.

Mr Blyth had been with the Institute for seven years, first as Assistant Editor and then Editor of the *Polar Record*, and his services to the Institute have been very considerable. He has gone to the Foreign Office in London, but returns at weekends to give his help. His place has been taken by Mr Max Forbes who began full-time work on 3 January 1955.

Miss Butterworth resigned from her post as Librarian and Information Officer in October 1954 after four years of valuable service. She has been replaced by Mr H. G. R. King who took up his post on 11 January 1955.

Miss Blomfield resigned in order to be married and her departure is much regretted after her spirited and valued work as Assistant to the Director. Her place was taken by Miss Ann Burkinshaw who began work on 20 December 1954.

Miss Shirley Webb joined the Institute as a full-time Junior Clerical Assistant in October 1954.

Finance. During the year the Institute received, under the same arrangements as were recorded last year, the following sums which are gratefully acknowledged:

H.M. Treasury grant-in-aid. The sum of £4200 was received for the year ending 31 March 1955. In addition there has been received the first half-yearly instalment (in July 1955) of the increased grant of £5250 per annum for the year ending 31 March 1956.

Australia. A donation of £A500 (£364. 19s. 3d.), authorized by the Australian cabinet was received on 24 May 1955.

Canada. \$1000 (Canadian) was received on 23 March 1955 under a contractual agreement between the Institute and the Defence Research Board of Canada.

New Zealand. A grant of £100 sterling was received from the New Zealand Government on 19 October 1954.

Falkland Islands Dependencies Administration. A sixth annual subvention of £100 was made by the Governor of the Falkland Islands and was received on 4 January 1955.

The Audited Accounts for the year ending 31 July 1955 have been seen in draft. The Main Account shows a small surplus, after cancellation of the accumulated deficit, resulting from a change in the time of payment of instalments of the Treasury grant-in-aid.

Publications. Since the last Annual Report was published three numbers of the *Polar Record*, No. 48 (a month late), No. 49 and No. 50 have been issued. From January 1955 three issues annually are to appear, in January, May and September.

The Index to Volume V has also been published during the year.

Lectures. Lectures were given at the Institute, following custom since 1946, during the Michaelmas and Lent Terms.

1954

- 6 November "The South Georgia Survey, 1951-52 and 1953-54", by Duncan Carse.
- 20 November "The British North Greenland Expedition 1952-54", by Commander (L.) C. J. W. Simpson, D.S.C., R.N.

1955

- 22 January "Scott's Last Expedition." Professor Frank Debenham, O.B.E., a member of the expedition, commented on the film, "Ninety Degrees South" made by H. G. Ponting.
- 12 February "The War in the Arctic, 1941-45", by Douglas Blyth.
- 26 February "The Background of Arctic Airways", by John Grierson.

Friends of the Polar Institute. As last year it can be again recorded that the membership is still close to 300, representing a total subscription of about £500 a year. The Committee greatly appreciates the enthusiasm, generosity and help of the Friends.

Gino Watkins Memorial Fund. The Watkins Award for 1955 was made to Mr M. B. Bayly of King's College, Cambridge, in recognition of his geological work in Spitsbergen during the last five years.

The stock of equipment held by the Fund continues to increase. Loans of equipment for use in the summer of 1955 were made again this year in particular to the Cambridge Physiological Expedition to Spitsbergen under Dr Mary Lobban and to the Oxford University Expedition to North East Land under Mr John Hollin.

Visits. Miss Ann Savours, the Assistant Librarian, joined the Cambridge Physiological Expedition to Spitsbergen at the end of May.

Mr P. A. B. Gethin, Assistant in Scandinavian Studies, visited various institutions whose work is of interest to the Institute, in Oslo, Stockholm, Copenhagen and Gothenburg, in January 1955.

Library. During the year, 1801 publications were added to the library. Of these 793 were gifts, 286 were purchased and 722 were received in exchange for the *Polar Record*. These totals include some 400 periodical and serial publications. Of maps and charts, 362 have been received of which 49 were gifts, 47 were purchased and 266 were received in exchange.

The Institute wishes to record with gratitude a gift from Mrs Margaret Elbo of 240 books and pamphlets belonging to her husband, the late Mr John Elbo, formerly Assistant in Scandinavian Studies. The Eskimo section of the library has been much enriched by this addition.

The Library Reserve Fund was used to buy from Messrs A. Asher and Co. of Amsterdam a complete set of Dumont d'Urville's *Voyage au Pole Sud et dans l'océanie sur les corvettes L'Astrolabe et La Zélée... pendant les années 1837-1838-1839-1840*. Paris, Gide et J. Baudry, 1843-47. The work consists of 21 large octavo, calf-bound volumes of text, and seven folio volumes of maps and plates, many hand coloured. This is a bibliographical rarity and one which the library may well be proud to possess.

The Institute would like to express well-merited thanks to Miss C. K. Golding of Exeter for voluntary work in carding and indexing.

Gifts. The Institute is most grateful for all the valuable publications sent to the library in exchange for the *Polar Record* and regrets the impossibility of acknowledging them here severally.

We wish to thank the many people and organizations who have so kindly presented the following items:

Books and reprints

Professor H. W. son Ahlmann	B. Fristrup	M. Marret
Lady M. Alexander	P. A. B. Gethin	M. F. Meier
M. Angot	W. Gibson	H. W. Menard
M. Anraku	J. L. Giddings, jr.	Kaptajn E. Mikkelsen
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Rev. E. A. Armstrong	W. E. Godfrey	A. Russell Mooney
Dr E. Aubert de la Rüe	Miss D. Good	Dr G. J. van Oordt
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C. C. Bates	Dr M. Grotewahl	J. Pedrero
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L. G. Berry	Dr J. E. Hamilton	Professor N. Polunin
Captain P. Bethell	H. C. Hanson	F. Prohaska
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J. B. Bird	Professor F. K. Hare	Professor H. M. Raup
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Dr M. Brown	F. Illingworth	Miss A. M. Savours
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L. C. G. Clarke	C. Jouanin	P. M. Scott
R. Clarke	H. Kaminski	G. Seligman
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G. Cooch	Dr H.-P. Kosack	G. B. Stigant
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A. P. Crary	C. Krypton	Professor H. U. Sverdrup
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 Royal Norwegian Information Service, London
 Royal Ontario Museum of Zoology and Palaeontology
 Saskatchewan. Bureau of Publications
 Saskatchewan. Department of Agriculture
 Science Museum, London
 Skid och friluft Främjandet
 Soviet Embassy, London
The Times
 U.S. Air Force. Cambridge Research Center
 U.S. Army
 U.S. Army. Arctic Test Detachment
 U.S. Army. Snow, Ice and Permafrost Research Establishment
 U.S. Coast and Geodetic Survey
 U.S. Department of Commerce. Weather Bureau
 U.S. Embassy, London
 U.S. Geological Survey
 U.S. Navy. Chief of Naval Operations for Polar Projects
 U.S. Navy. Hydrographic Office
 U.S. Office of Naval Research
 U.S. Water Surveys Division
 University of Alaska. Geophysical Institute
 University of California. Institute of Engineering Research
 University of California. Institute of Navigation
 University of Cambridge. Department of Geography
 University of Oxford. Department of Geology and Mineralogy
 University of Washington. Department of Oceanography
 Weather Bureau, Pretoria
 Williamson Manufacturing Co., Limited
 Wisconsin Conservation Department
 Yukon Territory. The Commissioner

Maps and charts

Professor Olaf Holtedahl
 Dr H.-P. Kosack
 Wing Commander J. L. Mitchell
 Professor N. E. Odell

Dr B. B. Roberts
 Directorate of Colonial Surveys
 Generalstabens Litografiska Anstalt, Sweden

Photographs, negatives, slides, films, etc.

Dr T. E. Armstrong	Arctic Club
Dr P. G. Law	Australian National Antarctic Research Expedition, 1954
Commander J. H. Mather	Norwegian-British-Swedish Antarctic Expedition, 1949-52
H. F. McClintock	Royal Canadian Air Force
Professor N. E. Odell	Royal Canadian Navy
U. Røem	U.S. Air Force
Dr E. F. Roots	
P. M. Scott	
Air Transport Squadron 22, U.S. Navy	

Manuscripts, etc.

Letter from M. Lindsay to A. Courtauld, 18 July 1933	A. Courtauld
Photographic copy of record by Lieutenant Pelham Aldrich, 24 May 1876, deposited at Cape Fanshawe Martin, Ellesmere Island	G. Hattersley-Smith
Journal of J. G. Elbo kept during Scottish Spitsbergen Syndicate Expedition, 1948	Mrs Margaret Elbo
Catalogue of Svalbard literature	W. B. Harland
Transcripts of original journals, ship's logs, etc., concerning the arctic expedition of H.M.S. <i>North Star</i> , commanded by W. J. S. Pullen, 1852-54, and the search for Sir John Franklin in the Mackenzie River area, 1852-54, by Thomas C. Pullen	Rear-Admiral H. F. Pullen, R.C.N.
Photocopy of letter from Sir Edward Parry to Captain Crawley, R.N., H.M.S. <i>Hecla</i> , 29 March 1827	George A. Hall
Photocopy of letter from Sir John Ross to the Right Honourable Lords of His Majesty's Treasury, 20 March 1829	George A. Hall
Record of ornithological observations made during voyage of factory ship <i>Southern Harvester</i> to the Weddell Sea, 1953-54	Neil Macleod
Journals of Lieutenant Pelham Aldrich, H.M.S. <i>Alert</i> , Arctic Expedition, 1875-76	Miss B. N. Champion

Museum exhibits, equipment, etc.

Sample of asbestos ore from Liard, British Columbia	Cassiar Asbestos Corporation, Limited
Specimens of nylon rope	Messrs. William Kenyon and Sons, Limited
Portrait of Benjamin Leigh-Smith, by Reginald Eves, R.A.	Mrs R. Eves
Eight coloured lithographs of drawings by S. Gurney Creswell, arctic cruise of H.M.S. <i>Investigator</i> , 1850-53	Mrs E. Waring
Three eighteenth-century water-colours and one print of Icelandic geysers	L. C. G. Clarke
Duffle sleeping bag and rubber inflatable air pillow used during Arctic Expedition, 1875-76	Public Archives of Canada
Pair of snow shoes	Messrs. Jackson and Warr, Limited
Twilight computer and planisphere	Defence Research Board, Ottawa
Bronze statuette of Fridtjof Nansen	D. Baden-Powell
Samples of gold ore from Yellowknife, North-West Territories	Giant Yellowknife Gold Mines, Limited
Water-colour of Emperor Penguin chick (<i>Aptenodytes forsteri</i>), by E. A. Wilson	P. L. Gordon
Two water-colours by E. A. Wilson, <i>Discovery</i> Expedition, 1901-4	P. M. Scott

Experimental sledge made of aluminium alloy	S. T. Wright
Model of portable boat used by Cambridge Geological Expedition to Spitsbergen, 1954	W. B. Harland
Six specimens of mineral ores from Elsa, Yukon Territory	United Keno Hill Mines, Limited
Thirty-two reproductions of drawings by Belmore Brown	A. Innes-Taylor

J. M. WORDIE, *Chairman*

IAN COX

L. P. KIRWAN

GEORGE BINNEY

V. E. FUCHS

N. A. MACKINTOSH

B. C. BROWNE

W. B. HARLAND

NOTICES

The *Polar Record* is published in January, May and September each year. Contributions, also books and papers for listing in the bibliography of "Recent Polar Literature", should be addressed to the Editor, Scott Polar Research Institute, Lensfield Road, Cambridge, England.

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